LIGHT, MAY 14, 1936.

FIRST AERO WEEKLY IN THE WORLD

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The AIRCRAFT ENGINEER AND AIRSHIPS

1429
XXIX

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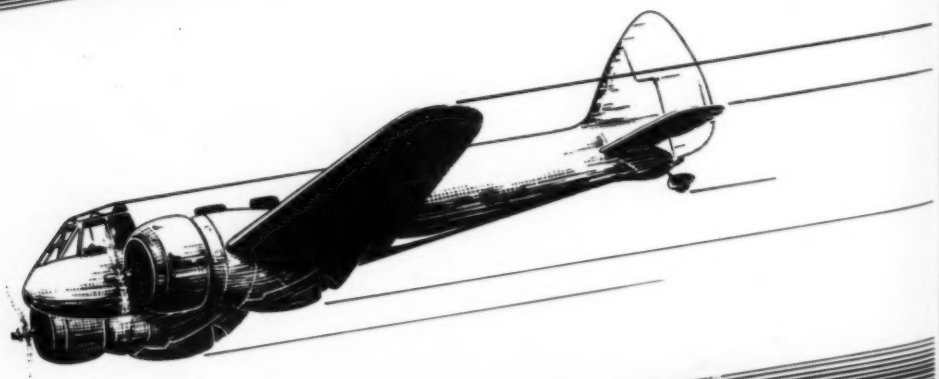

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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Stockholm

THERE is a feeling in certain sections of the aviation community that the British aircraft industry has failed to make the most of the opportunity offered by the International Aero Exhibition which opens in Stockholm to-morrow. Scandinavia has ever looked with friendly eyes on British aviation products, and it is argued that the potential market has now become such that a combined exhibit by the S.B.A.C. would have been worth while.

In fairness to British aircraft constructors it should be pointed out that the majority of them are so busy on work for the Air Ministry that they have little time to spare for anything else, even were they able to accept orders from abroad, which many of them are not. This applies to military aircraft, of course. The constructors of civil aircraft are in a somewhat different position, and it may be argued that they ought to have taken a great deal more space at the "static" show in Lindarängen.

Indoors and Out

It is open to argument whether an aeroplane on a stand or the same aeroplane at an aerodrome is likely to be the better proposition from a sales point of view. The ideal is doubtless to have both. But that is likely to be an expensive business. British constructors of civil aircraft have evidently taken the view that a large percentage of those who visit an exhibition are not potential purchasers in any case, and that therefore the value of exhibiting in the actual show is not very great. If a man is seriously interested in aircraft, he will find his way to the aerodrome, and there he will be able to see the machine in action, and will be able to go up in it, and to fly it if he is a pilot. The practical experience is likely to count much more than anything which he can be *told* on a show stand.

The Bromma airport of Stockholm will be officially opened on May 24, and May 25 has been set aside as a special demonstration day, during which those who so desire will have an opportunity to demonstrate their machines, and each firm will be given fifty free tickets to the airport, which it can issue to potential customers. It is to be hoped that a large number of British firms will take the opportunity to demonstrate their machines on that occasion.

The Fleet Air Arm

THERE was nothing surprising in the fact that during the recent debate on the Supplementary Estimates for the Navy, the old, old controversy concerning the control of the Fleet Air Arm should be revived. What was a little surprising was that Mr. Churchill should be the "revivalist." He of all people should know that this subject, one of the hardy annuals of the antagonists of the Air Ministry, has been thrashed out time after time. Inquiries have found against the separation of the Fleet Air Arm from the limited Air Ministry control. Commissions have sifted evidence, and have arrived at the same conclusions. Correspondence in the Press has waxed fierce and furious, but always the result has been a *status quo*.

On the face of it, the present system is rather absurd, and there is no use denying the fact that difficulties have arisen and are likely to arise. But what is the alternative suggested? That the Air Ministry should hand over the modicum of control which it now exercises. Superficially, that does not look like a very important step. All Fleet Air Arm personnel would be drawn from the Navy, and the Admiralty would be in full control. Complications connected with promotion in the service would be reduced or disappear, the Navy would be able to take the Fleet Air Arm anywhere it wished at any time,

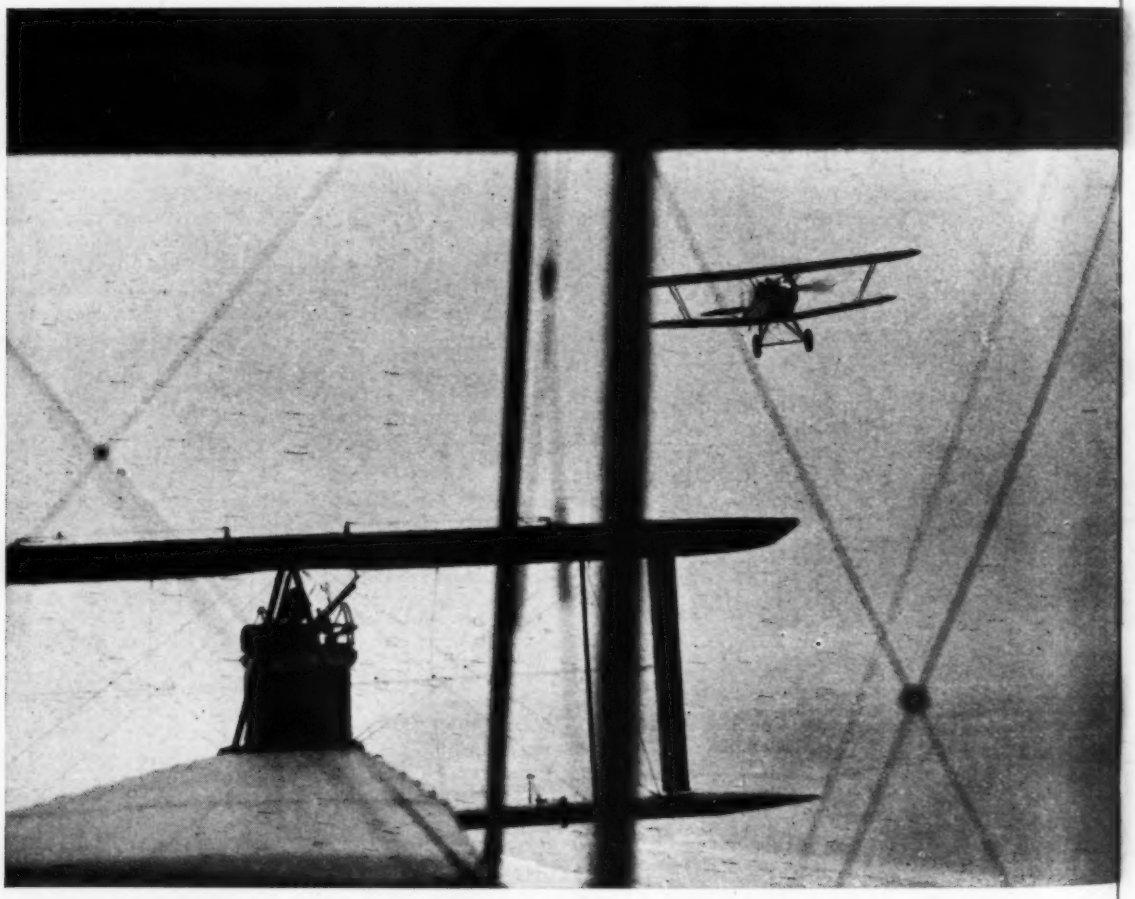
and altogether "everything in the garden would be lovely." But would it? If it were at all likely that the Navy would rest satisfied with having its own personnel under its own sole control, it would be very difficult to make out a case against the transfer. But does anyone seriously believe that the matter would end there?

Useless Duplication

Before long it is inevitable that the Navy would argue that the Air Ministry could not possibly meet the needs of the Navy in the matter of supplies of aircraft and aero engines, knowing little or nothing about the Navy's requirements. The logical outcome would be that in time the Admiralty would desire to order its equipment direct, and, apart from an undesirable competition for deliveries, that would inevitably mean the setting up of a great deal of machinery similar to that which already exists at the Air Ministry. Research would follow next, and in the end we should have a complete duplication which could only lead to overlapping and waste.

Mr. Churchill's attempt to blame the present system for what he described as the lack of numbers and inefficiency of the Fleet Air Arm's equipment was not worthy of him. He knows, no one better, that the Navy orders what it wants and pays for it. If it has not been able to persuade the Treasury of the urgency of its needs, that is hardly the fault of the Air Ministry. One hesitates to use the expression about Mr. Churchill, but he was definitely "talking through his hat" when he stated that the Fleet Air Arm has no flying boats that bore any comparison to those of leading foreign powers. The Fleet Air Arm, until very recently, had no flying boats at all, and only now are the Supermarine Walrus amphibians being delivered. They have not been in service with the fleet long enough nor in sufficient numbers to judge of their value. And, in any case, it is not the Air Ministry's fault that the Fleet Air Arm has not previously had flying boats. Had the Admiralty wanted flying boats sooner, doubtless they would have been provided. The Admiralty, and not the Air Ministry, decides what it wants.

Altogether, Mr. Churchill was not at his best in the debate on the Supplementary Navy Estimates. His attempt to paint the Air Ministry as the overburdened, too-tired-to-do-anything establishment, and the Admiralty as the "powerful and well-established department longing to assume full responsibility," was not very convincing.



WHAT THEY *CAN'T* BE SHOWN: Empire Air Day is on May 23. Every effort is being made to show the taxpayer and his family how the R.A.F. keeps in training, and the various units are organising some magnificent shows for the occasion. The thrills of actual Service flying must perforce remain untasted, but an admirable impression is given by such photographs as this one, which, taken at Martlesham, shows the R.A.F.'s newest army co-operation machine—the Hawker Hector with 725/805 h.p. Napier Dagger—on the tail of a Pegasus-Virginia. (*Flight* photograph.)

The Outlook

A Running Commentary on Air Topics

Is It Necessary?

SOME time ago *Flight* called attention to the alarming way in which military aircraft equipment is increasing, and the lack of standardisation which threatens to interfere seriously with production. It is now becoming evident that, if a careful eye is not kept on things, confusion may well become worse confounded by the multiplicity of materials gradually being introduced into aircraft construction. The metallurgist is largely to blame for this fact. The user clamours for metals with certain properties. At first they are not available, but history has shown that if the demand is insistent enough the metallurgist will, sooner or later, produce them. Opinions differ as to what is really required, and so the metallurgical wizard produces a variety: "something for every taste." The result is that the number of specifications grows by leaps and bounds, it takes reams of paper to keep track of them all, and the bins in the aircraft constructor's stores look like Joseph's coat, so great is the number of colours needed to identify the different classes of material.

While the striving after greater and greater structural efficiency is understandable, and indeed inevitable, one wonders whether the almost innumerable specifications now in force are really necessary, strictly speaking. On the drawing board and in the stress department they look very attractive, but is not the price paid in time, money and inconvenience really too high?

It is impossible to walk through a modern aircraft constructor's stores without being seized by a hankering after the return to the old days when there were only three main structural materials: wood, steel and fabric. One knows, of course, that that is impossible, and that one would not wish to return to them if one could, but there seems to have developed a state of affairs in which all sense of proportion has been lost.

British Bureaucrats?

WHEN we complain so much about red tape, officialdom and discourtesy shown towards visitors to foreign aerodromes it is a little disconcerting, to say the least, to find that we ourselves, the British, are being accused of similar practices.

This is an extract from an account, in the American journal *Western Flying*, of an African tour recently completed by Mr. Charles Lajotte, chief of the aviation department of a well-known oil company:

"Every time we landed at an airport run by the British we were immediately greeted by three stock questions, "Where are you from?" "Where are you going?" and, "How long do you intend to stay?" And these three questions are always shot at you before the motor has had time to stop. It annoyed me at first, but soon I grew used to it and entered into the spirit of the thing, and began to fire my answers back at them almost before they had time to ask them.

"These British bureaucrats take themselves and their jobs very seriously, and are not to be cajoled an inch off the line of their prescribed duty. One of them, after refusing me permission to alter my itinerary, which would have saved us an inconvenience due to a last-minute change in plans, had the gall to write in my log book: 'This pilot has been notified that he must land at Wadi Halfa for clearance before leaving the Egyptian land.' Strange as it seems, this pilot duly landed at Wadi Halfa."

Of course, there may be another side to the picture, and questions are necessary in any case. But the American pilot's complaint at least deserves noting.

The Pou Position

FLYING of *Poux-du-Ceil* is not, after all, to be banned. In a leading article last week *Flight* stated: "It may be wise to suspend the flying of new *Poux* for the present. Examples which have already proved satisfactory should not be grounded."

The Secretary of State for Air has decided not to suspend at present the permits under which these machines are flown, and in so doing he is undoubtedly quite logical. The Gorell Committee recommended, and the Air Ministry accepted in principle, that small private aircraft should be exempt from the usual airworthiness regulations. It would have been quite illogical to go back on that decision because of two accidents.

Both the Gorell Committee and the Air Ministry realised that in releasing light aircraft from the previous strict control, the way was opened to a certain amount of abuse, should unscrupulous firms come on the market with unsafe machines. At the time of the Gorell Committee the *Pou* had not arrived on the scene, and perhaps the possibilities of private construction had not been foreseen. But the general principles upon which the Committee argued are as valid to-day as when they were first discussed.

A Practical Safeguard

THE safeguard suggested and adopted is as much of a safeguard now as it was before the *Pou* entered the picture. That safeguard is the compulsory third-party insurance. If an insurance company once gets the idea that the machines built by a certain firm, or the single machine built by an individual, is not sufficiently well built, it will refuse to insure that firm's or that individual's machine, and that is the most effective form of "grounding" one could have. In sheer self-defence, to put it on the lowest plane, the firm will see that its products are accepted by the insurance company. Should the requirements gradually be stiffened as a result of experience, the firm will have no option but to comply with them or go out of business forthwith. That is surely all the control that is wanted.

Mrs. Mollison's Fine Show

WHATEVER doubt may have existed—certainly there was very little in this country—that Mrs. Amy Mollison is the world's finest woman pilot must have been dispelled at one sweep by that astoundingly plucky young lady's new England-Cape record. Her consistently fine navigation and fair adherence to a prearranged schedule have evoked the plaudits of the most experienced long-distance pilots, but it is the calm determination which brings forth quite spontaneous congratulations from the toughest masculine record-hunters. "Tommy" Rose spoke for everyone in the industry when he said, so concisely, "It is a damned stout show by a very gallant young woman." And "Tommy" has every reason to know.

Amy is "coming back," in two senses, with a vengeance: at the time of going to press she has reached Mbeya, Tanganyika, on the return trip, having made up some lost time.

Her husband has lately returned from abroad and awaits her to plan a joint round-the-equator flight. There is no telling to what heights, given a good aeroplane, their combined experience will take the Mollisons.

Panorama: A fine impression of Fairey's Great West Aerodrome during the opening item of the Garden Party.

A SOCIAL O

The British Aviation World and His Wife Aircraft at R.Ae.S

(Illustrated by *Flig*

THIS year's Royal Aeronautical Society Garden Party, again held on the magnificent Great West Aerodrome, by permission of Mr. C. R. Fairey, was one which should have delighted the pacifically-minded among the spectators.

Whereas last year's event resounded to the roar of fighters flown by such redoubtable aerobatists as Flt. Lt. Staniland, Sunday's meeting was an an all-civil affair. There were only two military types present, and neither took the air. One was a Fairey Swordfish (690 h.p. Pegasus III), and the other the Fairey Battle bomber (with its Rolls-Royce Merlin now driving a three-bladed Hamilton C.P. airscrew) standing in solitary state in a sort of roped-off boxing ring. Apparently the Air Ministry had disapproved of a demonstration in this instance, but the absence of other military types was less easily explained. The story that most constructors "were too busy" did not sound very convincing, and one is inclined to wonder if there was not more than mere rumour in the opinion (which we several times heard expressed) that the Garden Party was considered to be poaching on the preserves of the R.A.F. and S.B.A.C. Displays; certainly last year's Party might well have constituted a threat in this direction, so representative were the aircraft and so brilliant was the flying.

All this is not to say that Sunday's affair was a failure.

Among the visitors: (Left) Maj. G. H. Abell, of the Bristol Company, and Mrs. Abell. (Above) Mr. Oswald Short and Mrs. Short.

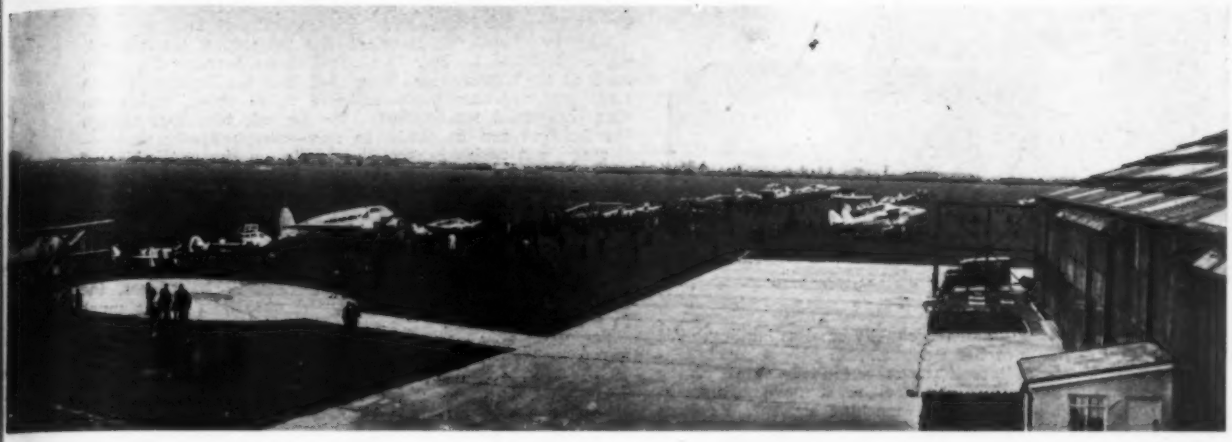
Lt. Col. J. T. C. Moore-Brabazon, president of the R.Ae.S., welcomes Cap. R. L. Preston (hon. sec., Household Brigade Flying Club) and Mrs. Preston.

The Rolls-Royce Heinkel (four passengers and two pilots), which is credited with a speed of 240 m.p.h. from the Kestrel engine. In the air is the B.A.C. Super Drone.

Far from it; there was flying by a fine and very complete collection of civil types from *Poux* to "giant air liners"; but undoubtedly there was a same-ishness which would have been happily relieved by the appearance of one or two lusty military types.

Taking the term "garden party" in its more conventional sense, nobody could complain. There were all the ingredients—trim grass, charming frocks (and their wearers), the R.A.F. Central Band, and tea by Gunter's. To give a list of the notabilities would be impossible, for literally everybody who is anybody in the world of aviation was there. Sir Philip Sassoon (Under Secretary of State for Air) was present, together with a number of high officers of the Royal Air Force and foreign air attachés, a list of whom will be found on page 510.

Just as representative, again, were the visiting aircraft, privately owned and otherwise: Imperial Airways and British Continental D.H. 86's; the beautifully finished and intern-



L OCCASION

Vatch Demonstrations of the Latest Civil Garden Party

Photographs)

The Reading contingent : (left to right) Mr. C. O. Powis, Mrs. Stent, Mrs. Powis, Mrs. F. G. Miles, Mr. Miles

ally furnished Heinkel He 70, used as a flying test bed by the Rolls-Royce Company (and capable of about 240 m.p.h. with a Kestrel); a high-wing cabin monoplane (two Gipsy Majors) specially built in Austria to the design of the Archduke Anton of Hapsburg; and even an old but sturdy little Westland Widgeon, guarded by wire terrier which, from his place in the cockpit, said rude things to anyone who approached.

After the reception of the guests by the President of the Society, Lt. Col. Moore-Brabazon, Mr. E. G. Hordern opened the flying programme with the Heston Phœnix (200 h.p. Gipsy Six), giving a demonstration thoroughly characteristic of the machine—that is to say, one which showed how admirably the Heston Aircraft Co. have combined a useful turn of speed (148 m.p.h. top) with real silence ; it was a pity that the comfort and quietness of the five-seater cabin could not have been equally well demonstrated to those unacquainted with it. The actual flying in this demonstration, though consisting of little more than beautifully executed steep turns

Government investigation of the *Pou* question ! Lt. Col. Sir Francis Shelmerdine (Director-General of Civil Aviation) and Lady Shelmerdine inspect the Abbott-Baynes cantilever machine.

and hesitating stalled turns, was as effective as any. Aeroplanes are, after all, means of transport in the concrete rather than the ecstatic sense.

Capt. E. W. Percival followed, displaying the speed (170 m.p.h.) of the four-seater Vega Gull by low-altitude passages at full throttle, and then proceeding to various semi-aerobatic evolutions, concluding with some impressive flaps-down dawdling. The light green monoplane, sunlit against a dark storm-cloud, made an attractive picture.

Two engines next took the air, Mr. Macphail performing in the new De Luxe Monospar (90 h.p. Pobjoy Niagara II's). In the interests of improved fore and aft and directional stability, twin rudders (with a greater elevator surface made possible thereby) have been experimentally fitted to this machine, and it is likely that on later models this layout will be standardised. *Inter alia*, Mr. Macphail gave a convincing safety demonstration, flying with one engine idling and, in fact, making gentle turns against the one useful motor.

Next, Mr. F. G. Miles took up the new "Whitney Straight Special," which is a side-by-side two-seater with very ample luggage accommodation, designed either for touring or training. A note on this machine appears on page 516 and a photograph will be found on p. 503.

Those who were not aware of its presence, and who noticed it for the first time in the air, might have been mildly puzzled by its appearance, for a typically Milesian rudder goes with wheel spats more suggestive of a Gull's, instead of the familiar trousers of the Major and Falcon—all of which sounds like an essay in some new science of sartorial ornithology. It is doubtful if Mr. Miles' demonstration would have been fully appreciated by everyone, though the full control while with the flaps down was most impressive. Even more so was the deliberately careless take-off—turning

The Gipsy-Major-engined monoplane built in Austria to the design of Archduke Anton of Hapsburg.

eventually across wind—and the equally careless landing. We should see a lot more of this machine.

And now a "giant" took the stage, in the shape of the new ten-seater Monospar S.T. 18 or Croydon, which in point of size was the most impressive machine present, its high undercarriage and the unusual shape of its tail making it appear to tower even above such *fauna* as D.H. 86's. Flt. Lt. Schofield put it through its paces most impressively, the diapason of the two 400 h.p. Wasp Juniors and the scream of the C.P. airscrews adding to the effect; internally, however, it is unexpectedly silent for all save the pilots. During the afternoon some hundreds of people must have clambered inside to sample the luxury of Mr. Rumbold's upholstery—and to flip open the lids of the window-ledge ashtrays, which must be a new manifestation of that universal vice of kicking the tyres of motor cars. A top speed of well over 200 m.p.h., and a "flapped" landing speed of 63 m.p.h. made Flt. Lt. Schofield's demonstration an outstanding one.

A third example from the Monospar range, the Ambulance, was again shown off by Mr. Macphail (who had not previously handled this particular machine), and a pretty sight it made with its all-white finish and red crosses—though we did hear someone complain that they'd forgotten the bell. Built on the same basic lines as the rest of the Pobjoy-engined Monospars, it contains stretchers, Float-on-Air pillows, medical stores, oxygen and blood transfusion apparatus and pretty well everything else except an out-patients' department.

Doughty Dowty!

Mr. R. A. C. Brie, in the C.30A Autogiro (140 h.p. Genet) gave his well-known impersonation of a tube lift; on his final descent he proved the strength of the undercarriage by dropping the machine vertically on to the ground from a greater height than usual and the burst of engine may or may not have been given a little late. Anyway, the undercarriage appeared to like it.

Some grass-cutting and other flying by Mr. Kronfeld in the Super Drone (24 h.p. Douglas) enlivened the first tea interval. He likewise demonstrated the little machine's stability by simulating the attitude casually adopted by those who feel revolver muzzles in the small of their backs. His landing, carried out with arms in the same position, suggests that the machine was trimmed for the purpose—held down until the final five feet or so, and then allowed to level off naturally. Apart from its safety aspect, this last demonstration showed Mr. Kronfeld's skill more convincingly than anything.

There followed an item of the kind which always pleases, because it is unfamiliar to so many people—a flight of four sailplanes, wheeling and hovering gracefully in the sunlight, for the most part in fascinating silence, though occasionally one or other would emit an ethereal whistle as the pilot put the nose down to gain a little speed. They were launched by car-axle winches on the far side of the aerodrome, and it was a pity that the wind direction did not allow this interesting process to be carried out nearer the spectators.

The sailplanes concerned were a British Falcon III side-by-side two-seater from the London Gliding Club, made by Slingsby, Russell and Brown, and flown by Mr. H. Slingsby; a Cambridge II built by Dart Aircraft, Ltd., and flown by Mr. E. J. Furlong; a gull-winged Kirby Kite (Slingsby manufacture) flown by its owner, Mr. D. Hiscox; and the even more superbly finished gull-winged German Rhönsperber, with roofed-in cockpit, flown by Mr. Christopher Nicholson. A machine of this type holds the world's record for a straight-line journey of 318 miles. Those who complain about the external finish of many aeroplanes should examine one or two modern sailplanes—and the comparatively low prices.

Another crazy-flying interlude, for the second tea interval, was contributed by Mr. J. H. Hill in an Aeronca C.3., who made it do almost everything that one has associated with more powerful aeroplanes—and did it, at times, rather too near the crowd for comfort. He showed, too, that though the Aeronca can be made to spin—comparatively slowly—it comes out with unexpected rapidity on the application of opposite rudder. Perhaps the most impressive feature of the display was the landing followed by violent, yet safe braking; the machine can hardly have run more than ten yards.

It is probable that very few of the spectators had previously seen the latest American machine to be sold in this country—the Cessna C.34, which was shown by Surrey Flying Services, the agents, and flown by Mr. S. L. Turner, the owner. Its fighter climb and speed were admired as much in the air as its clean lines were admired on the ground.

Mr. Stephen Appleby, who had arrived in grand style in a Puttnam *Pou*, demonstrated the Abbott-Baynes cantilever *Pou*, arousing immense interest among the many hitherto unacquainted with the breed. He likewise demonstrated the Puttnam *Pou* at a later stage.

Single-seater Show

Flt. Lt. Moir then took up the pretty single-seater Miles Sparrowhawk (130 h.p. Gipsy Major) for an extremely tidy aerobatic display, opening with some upward rolls. All the more normal evolutions were carried out with a deliberation which indicated both ample power and superb skill.

Next came the inevitable parachute jump, Mr. F. C. Coveney, harnessed to an Irvin, departing from Mr. Irvin's own Stinson Reliant. We must put down to a strenuous afternoon's work Mr. William Courtenay's announcement that "the machine is approaching the aerodrome and the pilot is about to jump"—and give him full marks for an informative running commentary.

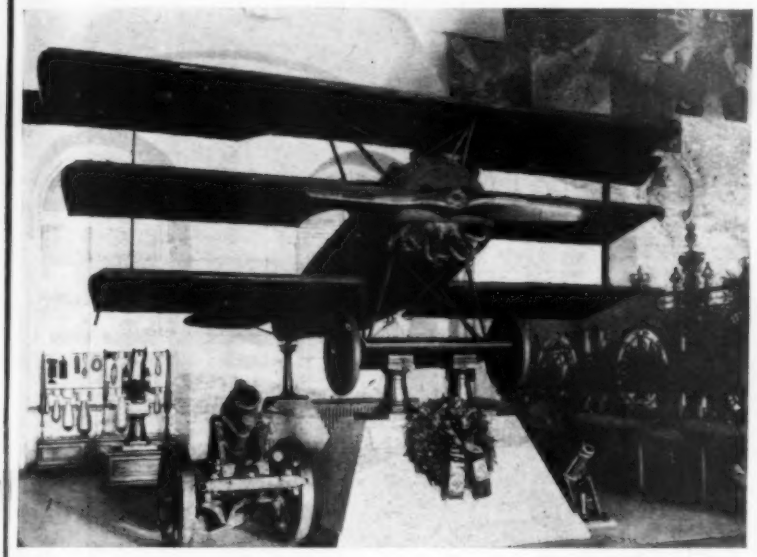
Flt. Lt. Tommy Rose put over a typically clean and precise semi-aerobatic display on the King's-Cup-and-Capetown Gipsy Six Falcon (and on landing, found himself in imminent peril from autograph hunters), while Flt. Lt. C. H. A. Colman wound up the flying display with a slow flying, fast flying, and short landing demonstration with the Series II Airspeed Envoy (two 250 h.p. Wolseley Scorpios).

There remained only the set-piece, in the shape of an "aeroplane" of doubtful aerodynamic qualities. This having been suitably surrounded by shavings, a match was applied, and, when things had warmed up a little, two gentlemen in asbestos suits (a speciality of Bell's Asbestos Co., Ltd., who arranged the demonstration) waded in and rescued the "unconscious pilot," who looked decidedly limp and showed a tendency to bleed sawdust. The Monospar ambulance then landed alongside and Mr. S. J. Noel-Brown, as doctor, assisted by a nurse, collected the sawdust-stuffed victim on the stretcher—during which process he became magically transformed into a remarkably healthy looking human being. Undoubtedly the most entertaining aspect of this item was the running commentary unwittingly supplied over the loud speakers by a little girl who apparently was addressing "Daddy" within range of the microphone.

The popularity of stratosphere exploration suggests expeditions in the reverse direction—with the aid of asbestos suitings of the kind demonstrated at the Garden Party.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



HOMAGE TO AN ACE: On the eighteenth anniversary of the death of Richthofen the director of the German State Museum laid a wreath before the scarlet Fokker triplane at one time used by Germany's greatest war-pilot.

WADDINGTON, near Lincoln, has been added to the list of R.A.F. stations to be open on Empire Air Day.

An eighteen-cylinder two-row radial is the latest Gnome-Rhone product.

The Air Ministry has acquired land at Canewdon, Essex, for a wireless station. Other land is being purchased.

The B.B.C. is to broadcast part of the London to Isle of Man air race on May 30.

An Autogiro which "flies" off the stage is a feature of the new Drury Lane show, "Rise and Shine."

Unable to walk since she was three years old, Miss Betty Snell, of London, Ontario, has qualified for a pilot's licence.

Three Russian airmen who were lost in the Arctic for twenty-five days have been discovered alive near Yenise Gulf, Siberia.

It is expected that this year civil aircraft will fly 4,000 hours in exercises with the Observer Corps, the Regular and Territorial Armies and the Royal Navy.

A date for golfing enthusiasts to mark in their diaries—the Aero Golfing Society's *Flight* Trophy Competition at Richmond Golf Club on Thursday, July 2.

An exhibition of airport design and equipment is to be held in November by the Royal Institute of British Architects, and will afterwards go on tour. The organisers (at 66, Portland Place, London, W.1) are anxious to secure suitable exhibits.

Twenty-five Years Ago

(*From "Flight" of May 13, 1911.*)

". . . Your article on the possibility of launching an aeroplane from the deck of a battleship and dropping bombs on the deck of a ship. . . . I am sure any commander would look askance at such structures on his decks, while the use of bomb-dropping devices makes the whole appear ridiculous and tends to obscure the great services the aeroplane could render in naval warfare."—(Reader's opinion.)

In Strange Harness

According to a recent report, Italian troops operating in the Danakil Desert were supplied with live animals for food by air, the unfortunate beasts being dropped by parachute.

In Memoriam

Two R.A.F. flying boats flew last week to the scene of last year's crash off Havre, when three R.A.F. men lost their lives. A service was held to commemorate Aircraftman William Watkin, whose body was never recovered.

An Ambulance Record

A Swedish Northrop Delta (Pratt and Whitney Hornet), flown by Mr. Linder, has carried a Swedish millionaire patient from Biarritz to Stockholm in one day. His affliction demanded that the height should not exceed 1,500 ft.

Re-shuffling at Hanworth

The Hanworth Country Club has been re-named the Hanworth Park Hotel. Everyone—aeronaut or plain visitor—is welcome: henceforth there will be no landing fees. There are three hard courts and other games facilities.

Distinguished Passenger

Viscount Swinton, Secretary of State for Air, recently flew for half an hour in the Fairey Battle with Flt. Lt. C. S. Staniland, who took the machine through almost the entire range of aerobatics. After his flight, Viscount Swinton expressed his satisfaction with the ease of control and powers of manœuvre.

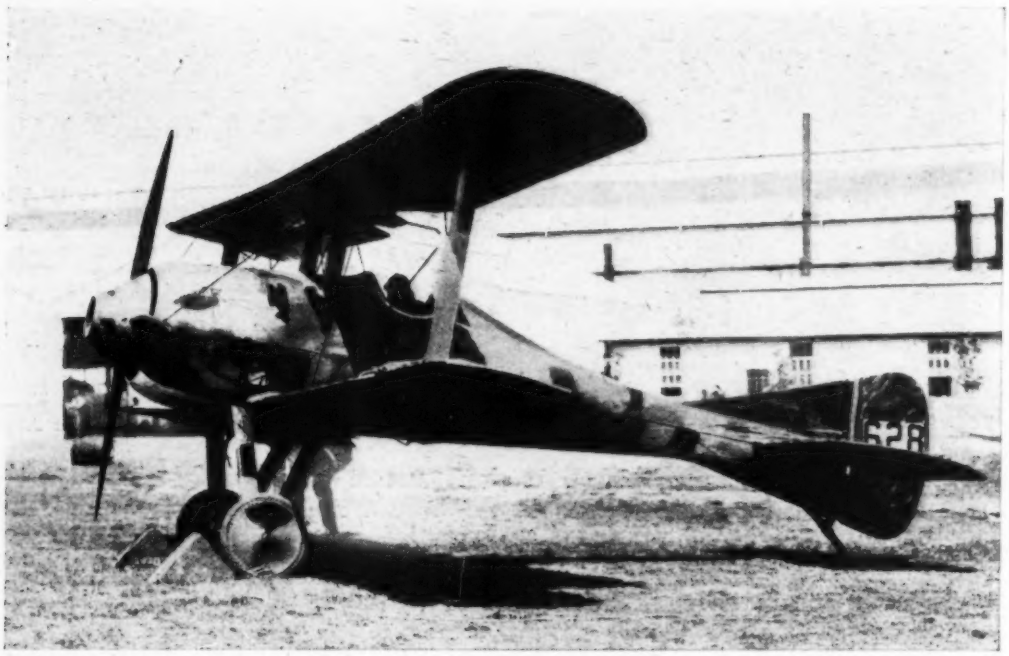
The Hindenburg's Record

A record for the North Atlantic crossing by an airship has been made by the Zeppelin *Hindenburg*, which took 61 hr. 38 min. for the 4,381-mile Friedrichshafen-New York trip. She moored at Lakehurst, New Jersey, last Saturday, an hour and a half after passing over the city.

FOUR TO ONE: The Miles-Whitney Straight Special two-seater (Gipsy Major) has a speed range of 4 : 1. Note the new style of clear-view windscreen. Brief particulars of the machine on p. 516

MODERN AERODYNAMICAL DEVELOPMENT

A "Popular" yet Accurate Review by the Superintendent of the Aerodynamics Department of the N.P.L.



TWENTY-TWO YEARS AGO: One is reminded of the old saying that "there is nothing new under the sun" by this photograph of the S.E.4, which was designed and built by the Royal Aircraft Factory (now the Royal Aircraft Establishment) in 1914. The machine was flown in June of that year by Mr. (now Group Captain) N. C. Spratt and by Major (now Marshal of the Royal Air Force Sir John) Salmond. It is interesting to note that the machine incorporated such "modern" features as a streamline fuselage, faired axle and strut joints, inter-plane I-struts, four-bladed airscrew with spinner, long-chord engine cowling, and variable-camber wings. Later the pilot's cockpit was roofed in.

THE forty-second James Forrest Lecture before the Institution of Civil Engineers was given last week by Mr. Ernest F. Relf, A.R.C.Sc., F.R.Ae.S., Superintendent of the Aerodynamics Department of the National Physical Laboratory. Mr. Relf gave a masterly review of what has been achieved during the last six years (Professor R. V. Southwell delivered his lecture—the previous aeronautical lecture in this series—in 1930) and succeeded in treating his subject, "Modern Developments in the Design of Aeroplanes," in a manner which, while perfectly clear to an audience consisting of civil and not of aeronautical engineers, would have passed muster by the most critical high-brow scientist. In other words, Mr. Relf was "popular" without being inaccurate, instructive without being condescending. *Flight* would have liked to publish the paper in full, but space does not permit.

Mr. Relf called attention to the fact that in 1914 Dr. Lanchester prophesied that advance in aircraft performance would come mainly from aerodynamic sources, and that no great improvement could be expected from increased efficiency of the petrol engine. Professor Southwell, in 1930, showed clearly that this was one of the rare occasions on which Dr. Lanchester's predictions had not been correct. During the last six years, Mr. Relf continued, the pendulum had swung over to Dr. Lanchester's side, and great advances had been made in aerodynamic efficiency. By way of an example the lecturer made a comparison between the Fairey Fox, a good machine of 1930, and the De Havilland Comet. The Fox had a top speed of 152 m.p.h. with an engine of 540 b.h.p., and the Comet did 235 m.p.h. with two engines totalling 470 b.h.p. Of the Comet Mr. Relf said that, "There were no elaborate wind tunnel tests on this machine; it was produced simply by the determination of a very able designer to apply all the available ideas on aerodynamic and structural improvement. It was built in an amazingly short space of time, and its success was phenomenal."

While on the subject of surface smoothness, Mr. Relf mentioned that the Fairey company had made a model by pressing indentations into a thin copper sheet and wrapping it around a wooden aerofoil, the object being to simulate the rivet heads used in stressed-skin construction. At low Reynolds numbers the drag curve broke away from that for the smooth wing, but as the Reynolds number increased, a maximum was reached, and there was a falling until, at the upper limit, the curve was not much above that for a smooth wing.

The Use of Slots

Of the Handley Page leading-edge slot Mr. Relf said that it was not very useful in reducing landing speed, as it needed a tall undercarriage to get the necessary large ground angle. The slotted flap developed by the same firm he described as better than the split flap because it gave greater extra lift with very little change of drag when put at a small angle, and was still as effective as the split flap for landing when put down to 60 degrees or so.

Discussing stability, Mr. Relf mentioned that cases had occurred recently in which the stability of some of the modern monoplanes had not been satisfactory, because the rules developed from experience of the thin-wing biplane could not be applied sufficiently well, and also because there existed relatively little experimental data on the stability derivatives of the monoplane in comparison with data for the older types of machine. Research was in hand, and there was little likelihood of dangerous instability in the new designs, but a great deal of time would be lost if the new machines had to

be modified after completion in order to cure them of minor instability.

Control at the stall was dealt with at some length, and Mr. Relf said that machines had appeared which were as good as slotted ones with regard to lateral control in stalled flight; to-day there was, he said, a definite tendency not to use tip slots.

In conclusion, Mr. Relf summoned up his lecture as follows:—

'There has been a 'cleaning up' of the aeroplane unprecedented in its history, the modern machine has been reduced almost to the bare essentials of the wing to lift it and the body to hold its contents, all extraneous drag-producing accessories have been removed or placed inside, the surfaces of wings and body have been made aerodynamically smooth, and structural design has tended towards the use of thin metal placed as near the surface as possible so as to secure the maximum stiffness with the least weight.

Future Progress

"Only a few machines have so far been built incorporating all these improvements, but the very near future will undoubtedly witness their almost universal application. Can we see any hope of future progress on these lines? There are three ways of progress; further reduction of drag, improvement of the engine, and reduction of structure weight. Will abstract science again, as in the past, provide new discoveries that will produce as great a change as that which has occurred in the period with which I have dealt? There will doubtless be steady, slow progress along all three avenues, but it would appear that nothing short of a revolutionary discovery can produce another spectacular change. We have seen that the margin remaining over pure skin-friction drag is only 70 per cent., and I have hazarded a guess that perhaps 40 per cent. of this may be gained by persistent attention to detail in design. A certain amount may also be gained by the reduction of surface other than the lifting surface of the wings, that is, by a closer approach to the so-called 'flying wing.' With small machines the effect of the surface reduction would probably be counterbalanced by the higher drag of the very thick wing that would be needed, but with large machines a considerable gain may ultimately prove possible in this direction. The revolutionary discovery we need as regards surface friction is to find a means to make the boundary layer flow remain laminar over a much greater proportion of the surface, or, in other words, to prevent turbulence from developing in the boundary layer itself. It this were possible, the drag of bodies at very high Reynolds numbers would be reduced to about 10 per cent. of the values to which we are accustomed. The prospect appears so bright that one is inclined to assume *a priori* that there must be a physical impossibility in its achievement, but I do not believe it is possible to *prove* that this is the case. If our researches on the nature of turbulence were to enable us merely to delay the inception of turbulence until, say, half the exposed surface has been passed, the resulting drag reduction would be very considerable.

"Great improvements in structure weight and in the power unit seem again only possible as a result of some new fundamental discovery. It is not impossible that research in atomic physics will open the way to the production of synthetic materials hitherto undreamed of, and that these will react greatly upon aircraft design. Still more speculative is the possibility that we may one day find a lighter means of producing or storing power than is provided by the heat engine and its fuel. Even if such discoveries are eventually made, it is doubtful if speeds of flight will ever rise very greatly, though we could, of course, obtain present speeds much more economically and also increase the range of aircraft enormously. My reason for saying that very great speed increases would not be made is twofold. In the first place the effect of compressibility of the air on drag sets a serious limit to speed, for as the speed of sound in air is approached, the drag rises very rapidly indeed. When we realise that the world's speed record is already nearly six-tenths of the speed of sound, we see that compressibility effects will become of paramount importance if great increase of speed is rendered possible by new discoveries. In the second place, there is the question of the temperature attained by a body moving rapidly in the air. The air is brought to rest on the surface and the temperature rise is of the order of the adiabatic change associated with the velocity. At 600 miles per hour the adiabatic rise is 36 deg C., and it varies as the square of the speed. The consequences of this upon the problem of engine cooling, to say nothing of cooling the passengers, is obvious. Both these difficulties can be overcome by flying very high, the drag being reduced because of the lower density, and the temperature rise being then even desirable on account of the low external temperature but very high flying brings its own problems of maintenance of engine power in air of low density."

"HINDENBURG" HEATS UP

Ventilation Difficulties on the New Zeppelin's First Transatlantic Flight

By RUDOLF VAN WEHRT (a Passenger on Board)

THE first long flight of the *Hindenburg* gave great satisfaction to all concerned, including her originator, Dr. Eckener; the commander, Capt. Lehmann; and the flight engineers and navigators. True, on the return journey two of the engines gave trouble, but they had been put to a very heavy test under stormy conditions, when the airship behaved admirably, giving never the slightest cause for anxiety. Yet minor snags naturally cropped up, as they will in any new machine designed to travel in any element. From the passengers' point of view, for example, there was the matter of ventilation.

When we left Friedrichshafen the vast fabric of the *Hindenburg* had absorbed the cold and fresh air of Lake Constance, and it remained with us, apparently, while we passed over the Atlantic on the outward flight.

But after the Zeppelin had landed at the aerodrome at Santa Cruz, near Rio de Janeiro, Brazil, her envelope became permeated with the hot, languid air of that swampy region. Thus, when she rose again for her return journey to Europe our cabins were as hot and sultry as any Turkish bath, and men with well-covered bones had only to rest immobile for a few moments in a cabin to perspire so freely that any clothing they might be wearing became soaking.

One passenger, who did not err on the side of frailty, was inclined to be querulous. "What's the idea of travelling in an airship if one must gasp for air?" he queried. Then he asked one of the officers, still in the same mood, if the two small holes in the wall of his cabin were supposed to serve as ventilators, and, when answered in the affirmative, said, sarcastically: "Do you suggest, then, that the stream of hot air coming through those holes is considered to be satisfactory ventilation?"

Captain Lehmann joined in our conversation, and endeavoured to soothe the irritable passenger, who, being convinced that air passengers through the damp, hot zones of the Southern Atlantic should enjoy great comfort, now felt he had been cheated of such delights.

Captain Lehmann explained that data on the question of ventilation in each new Zeppelin could only be collected during actual flight under varying conditions. By far the simplest method of ventilation would be provided by windows opening scoop-fashion in the direction of flight were it not for the fact that they would break the streamlining and detract from the ship's performance. Even a perfectly streamlined hull, however, had certain points on its surface at which considerable pressure was available, and at which ventilation intakes could be placed; and in the *Hindenburg* these points had yet to be determined under flying conditions. The existing intakes were not ideally placed, and as a result the ventilation did not work satisfactorily. [No doubt the matter has been attended to, as Major C. C. Turner makes no complaint in his *Daily Telegraph* articles on the North Atlantic trip. Some striking photographs appear on page 508a.—Ed.]

COMMERCIAL AVIATION

— AIRLINES —— AIRPORTS —

ALPINE FREIGHTER: The latest addition to Swissair's fleet—a Junkers Ju 86 fitted with two Jumo 205 diesel engines. This machine will be used primarily as a mail and freight carrier.

THE WEEK AT CROYDON

Ground Control : The Crowded Tarmac : An Expert Speaks : Late Arrivals and Their Rights : By Night to Central Europe : He Was Glad

THERE has been a certain amount of speechifying lately about air traffic control both in the air and on the ground. Those two all-important sides of the question are well organised and run smoothly—thanks to close co-operation between the Air Ministry and the traffic firms at Croydon.

One matter, however, cries aloud for control, and that is the parking of aircraft of all shapes, sizes, and nationalities on the tarmac previous to departure and on arrival. There is a rule that an aeroplane may not take up its position more than a certain time before its scheduled departure time, and this rule is moderately well kept. Aeroplanes must move off, of course, as soon as they are unloaded. It is, however, nobody's business to organise this parking, and there are favourite spots for which there is likely to be competition. Moreover, a machine due to start at a certain time is apt to get hemmed in by injudicious placing of other machines not due to start until a quarter of an hour later. Their owners are either absent at the crucial moment, or tend to waste precious time in pointing out that it is all somebody else's fault. Result—late departures which need not occur.

At most Continental airports this matter is properly looked after by some neutral official, and some such officer is badly needed at Croydon. I presume that harbour masters allocate ships' berths, and what is an airport officer if not a harbour master? The Dutch very logically call their chief airport officers harbour masters, and have done with it.

Air transport was used for a variety of reasons last week, and amongst other passengers by Imperial was one who made air history by being the heaviest air passenger on record, 25 st. 2 lb.! There was, of course, the usual diplomatic travelling by various important persons, and the best thing to say is that at least it is good for the air traffic business.

I was glad to hear that Capt. Wilcockson, of Imperial Airways, burst into oratory before the G.A.P.A.N. the other night. Mostly it is the theorists who hold the floor on these occasions, and pretty pathetic they sometimes sound to those who actually do the jobs. He spoke of the necessity that private owners and other pilots flying without wireless should keep off the air routes and away from terminal aiports in thick weather. Air liners are much less safe in such circumstances than a fleet with an active enemy submarine in their midst. I have known three or four big machines put down at emergency airports rather than approach Croydon when a small radioless craft was buzzing around trying to find the place in moderately poor weather.

Punctual Departures

The average traveller, and especially the regular business air traveller, demands exact punctuality of departure, and soon lets a company know if he thinks the standard is not high enough. There is, however, the other passenger who thinks that a machine should wait "a few minutes" if he happens to find it convenient to arrive late. Last week a Croydon company had this experience. A fully booked machine was all ready to leave with one vacant seat. The passenger was not there at the actual time of departure, so the seat was cancelled and resold to someone who had come to the airport on the off-chance of a seat. Log book and "ship's papers" were completed and the machine actually signalled away. Then, because a machine was about to land (in thickish weather), the control tower held up the departing machine. A railway parallel would be a train which had steamed out of the station and then halted with the signals against it. Five minutes after scheduled departure time the passenger arrived, and when he found the machine had not yet left the ground he was furious because he could not go aboard.

To bring the machine back to the tarmac; to carry the log book and papers in, alter the manifest, log book, and

passenger lists; readjust the weights on the load list, and get the whole lot initialled by Customs; to weigh the passenger and his baggage, get his passport examined, and, if an alien, to get him to fill in an alien's card covered with disconcerting questions about his sex, number of dependents, and the shape of his ears (most of these details must be completed in block letters), would have delayed the machine a further five to eight minutes. Here you have a passenger seriously contending that some fifteen to thirty other travellers ought to be held up for a total of perhaps a quarter of an hour because he does not trouble to turn up in time. A delay of that sort may, for the other passengers, easily mean the missing of vital air connections in Paris or Amsterdam.

This unreasonable and selfish behaviour could be stopped if it were widely advertised that, five minutes before the scheduled departure time, the barrier would be put up.

The new K.L.M. night service between Amsterdam and Cologne, though primarily a mail service, also carries passengers. Leaving London at 6.25 p.m., and Croydon at 7.45 p.m., a connection can be obtained which lands you at Cologne half an hour after midnight.

Leaving Cologne at 3.15 a.m., you reach Amsterdam at 5.5 a.m., and link up with the 7.30 a.m. departure for London, reaching Croydon at about breakfast time. The trouble about these night services, of course, is the depressing effect of turning out at ghastly hours of the morning at cold, wind-swept aerodromes.

The Imperial pilot who recently landed at Munchen Gladbach with a broken petrol pipe, did not affect Aberdonian economy to the extent of merely wiring his headquarters: "Gladbach on ground," though he must have been, considering the amount of fog about.

A. VIATOR.

New Equipment for Sabena

ON Saturday afternoon Croydon saw the arrival of a very new and shiny Junkers Ju.52 with Belgian registration letters. This was one of two which have recently been purchased by Sabena, their registration letters being OO-AGU and OO-AGV.

Gatwick in Action

ON and after May 17, British Airways' Continental services will operate from Gatwick airport, and the time-tables have been modified in each direction in order to connect with the "semi-fast" Southern Railway electric trains to Victoria. The fares will, of course, include first-class rail travel and tickets will be available also from London Bridge and the intermediate stations as well as from Brighton.

Wrightways at Work

QUITE apart from the Paris newspaper service and general charter work, Wrightways of Croydon have been given some useful overhaul work during the past few weeks, and their hangar looks more like an aircraft works than ever.

A few days ago there could be seen a D.H. Rapide, previously owned by Hillman's Airways and now owned, of course, by British Airways (for C. of A. and engine "completes"), a Puss Moth owned by Brian Lewis and Co. (C. of A. just completed) and a Leopard which was in the act of being rebuilt after a crash.

Automaticity at Croydon

THE demonstration two-axes P.B. automatic pilot is now back in Mr. Philip Bailey's Puss Moth—complete with dashboard controls which certainly were not there before. These consist of a "rate of turn" control, in the form of a milled knob, and four press-buttons by which the pilot precesses the gyros in order to change course or altitude. One or other is held down until the change has been effected.

The P.B. pilot, incidentally, which was previously being tried out in one of Wrightway's Dragons, has now gone to Reading—presumably for test in the Miles Peregrine, though the two-axes pilot is almost light enough to be a justifiable fitting in a smaller machine which is being used for long-distance charter work.

The Holiday Market

ON July 11 Olley Air Service will start their seasonal operations between Croydon and Deauville. This service, on which D.H. Rapides will be used, will be run three times in each direction, on Friday, Saturday and Monday, and once on the other days of the week. Meanwhile, Brighton is likely to be more firmly on the air map this year, and in due course the same company will fly thence to Dieppe and Ryde.

Despite considerable competition, the traffic carried by Blackpool and West Coast Air Services continues to be satisfactory. This company was, of course, the pioneer over the Isle of Man route and has, by regular and safe operation, made a very useful name which should balance, to some extent, the relative shortage of booking facilities. In the north there are, or will shortly be, four D.H. Dragons, two Fox Moths and three D.H. 86s. in service. The latter, of course, is the largest type on any I.O.M. route.

New Zealand's "Gapan"

THE first meeting of the N.Z. Air Pilots' Guild was held at Blenheim on February 29. Sub-committees were set up to investigate and report on the possibility of blind-flying instruction being made available to members; to inquire into the possibility of securing concessions in the matter of navigation instruction; and to obtain and verify details of the air experience of all members.

Radio in East Africa

REPRESENTATIVES from the Air Ministry and the Marconi Company have recently visited Mombasa in order to discuss the site for a radio station. This is to be installed in preparation for the commencement, next year, of the Imperial Airways' flying-boat service down the East African coast. In addition to this station, which will have D/F facilities on medium and short wavelengths, Mombasa is to have a meteorological bureau. Dar-es-Salaam has also been visited for the same purposes.

Another Big Machine

AT the works of Marcel Bloch a new four-engined transport machine known as the 160 is now nearing completion, the fuselage and wings having been finished. The forerunner of this machine is the Marcel Bloch 130, or "Pacifique," which is fitted with three Gnome Rhone K 14s. The new machine is destined for Air France's Far Eastern service to Indo-China, and will carry sixteen passengers by night and twenty-four passengers by day. Its top speed is estimated at 230-240 m.p.h., with a cruising speed of 207 m.p.h.

Air France have now definitely decided, as a basis of future policy, to build four-engined aircraft for their principal lines. A contributory factor has been the experience gained by the company in operating four-engined flying boats on the South Atlantic and Mediterranean routes, and also the success of the four-engined Farman landplane, *Centaure*, which now has two sister ships in service with Air France. As has already been stated in *Flight*, a fleet of six four-engined Farman forty-seaters of the *Centaure* type are to replace all existing French aircraft on the London-Marseilles route by this time next year.

Another Airport for London

LAST week (on May 7), by a comparatively small majority, the Corporation of the City of London decided to construct an airport at Fairlop, near Ilford, Essex, at an estimated cost of £600,000.

A motion was put down as long ago as December, 1933, by Mr. F. A. Horner, and a resolution was passed to consider the project. One of the proposals mentioned by Mr. Horner was the erection of a platform over the Thames between Southwark and Blackfriars bridges.

The Committee then turned its attention to normal sites, and after a considerable number of surveys they found one at Fairlop, Essex, about ten miles from the Mansion House and abutting on the London-Southend arterial road. The site comprises 940 acres and the expense of laying out the airport is expected to be charged to the general rate in view of the statutory power under the Air Navigation Act, 1920. The Rates Finance Committee were, by a majority, against the proposal so to charge the cost, and it was suggested that the City's Cash should bear the burden, and the debate centred itself round that issue.

Commercial Aviation

A CIVILIAN "G.P."

The Multi-purpose Stinson Reliant : Wheels, Floats or Skis

Edo floats can be specified for the new Stinson which is available in a number of different forms for specialised purposes.

THE new version of the internationally popular Stinson Reliant monoplane with the metal gull-type wing was illustrated and briefly described in *Flight* of February 13. Up to the present the Reliant has been used chiefly for "executive" and pleasure flying, but for 1936 the manufacturers are marketing what they call a multi-purpose version which is intended for the transport of passenger or freight, as an ambulance, or for the business man and sportsman pilot.

For commercial operation it is claimed that the machine offers the same degree of quietness, comfort and convenience as is associated with modern multi-engined transports. As a freighter the side walls of the cabin are metal-clad up to the window-sills, and when the rear seats and right-hand front seat are removed (this is the work of a few moments) the cabin becomes a strong, unobstructed hold. A specially large door in the rear cabin wall provides ready access to the back of the fuselage, and may be utilised for the unloading of large masses of freight. In addition to the large-sized cabin doors of the standard Reliant, the multi-purpose model has a special door on the right side for loading and unloading bulky packages. Fittings are provided for the installation of a stretcher and medicine cabinet, and the metal interior permits ready sterilisation.

Edo floats or skis are available as alternatives to the normal well-faired wide-track wheel undercarriage. The agents in this country are Brian Allen Aviation, of Croydon Airport.

Hatfield's Largest

THE D.H.91 monoplane, which is at present being designed at Hatfield and which is likely to be used for Atlantic experiments, is to be known as the D.H. Albatross. This machine, some details of which were given in *Flight* of March 19, 1936, will have four Gipsy XII engines.

Flying Boats to Australia

FOLLOWING the news, published in last week's issue, that a party was making a survey of India in connection with the future flying boat service, it is interesting to learn that Major Brackley and Mr. Hudson Fysh (of Qantas) have left Singapore for Australia in an R.A.F. boat. Their object, of course, is to survey the possible route to Brisbane and beyond in order to meet the present Australian objections to the Empire flying boat plans.

Return to Airships?

AS is generally known, a Bill is shortly expected to come before the U.S. Congress supporting an airship development programme. The recent flight of the *Hindenburg* should have some effect, and at Lakehurst a group of American naval officers looked over the vessel. Dr. Eckener is reported to have admitted that the U.S. flight was planned largely with the idea of obtaining backing for an American and German Transatlantic airship programme.

Holland's Unsurcharged Mail

HOLLAND was the first country on the Continent to abolish additional postage on letters and postcards to be conveyed by air to destinations either within Holland or in other European countries, including the United Kingdom, and the upward trend in the quantities of mail handled has been remarkable, as the following official figures show. The abolition was effective as from April 1, 1935.

Before the abolition (in 1934) the weight of air mail carried in Holland and to European countries was 1,595 lb. per month. In 1935 (after the abolition) 36,300 lb. were carried every month—an increase of about 2,100 per cent.! During the same periods the weight of the outward air mail on the Dutch Far Eastern line increased from 642 lb. to 906 lb. a week. This service does not carry air mail for European destinations, and in 1935, of course, the service was twice-weekly. The duplication certainly acted as a powerful inducement towards an increase in the use of the air mail on this particular service.

Shockless Skis

A FURTHER point of interest about the photograph of the De Havilland Rapide on skis, which appeared in *Flight* of April 30, is that the undercarriage is fitted with Dowty shock-absorbers specially developed for ski work by Aircraft Components, Ltd., of Cheltenham.

A New Aircraft Seat

A HIGH standard of comfort is embodied in an air liner chair of Airwork design which is both light in construction and low in price.

It was noticed first on the demonstration Dragon recently equipped for Smith's Aircraft Instruments, and is made of elektron, upholstered to the purchaser's requirements. It embodies a new attachment device and a system of lacing by which the entire upholstery may be removed in half a minute for inspection of the framework.

A Polish Summer

AFTER the winter semi-cessation the "L.O.T.," the Polish company, opened up their summer services on April 19. These include a daily through service from Warsaw to Berlin (2 hrs. 45 min.); a daily service from Danzig to Cracow, via Warsaw (3 hrs. 45 min.); and a thrice weekly service from Warsaw to Salonica, *via* Bucharest-Sofia, leaving Warsaw at 8.15 a.m. and arriving at Salonica at 5.5 p.m. The Warsaw-Tallin service will also be run three times a week, leaving Warsaw at 7.40 a.m. and arriving at Tallin at 1.45 p.m., and finally there is the daily service from Warsaw to Katowice.

The new Douglass D.C.2s and Lockheed Electras which were delivered last autumn have now been put into service. The reputation for safety of "L.O.T." was maintained in 1935.

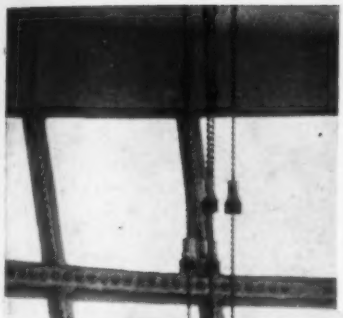
During that year they flew 1,037,500 miles, carrying 22,10[illegible] passengers, 369 tons of goods, and 63 tons of mail. Some of the pilots have been flying for several years, and six of them have completed their half-million kilometres.

In general, "L.O.T.," covering an area as it does from the Baltic to the Mediterranean, is an excellent example of a well-organised national civil aviation service and, as such, does great credit to the Polish Government. It is hoped by the end of this year to have a seaplane service in operation from Gdynia to Malmo and Copenhagen and a service from Warsaw to Moscow *via* Minsk.

It is reported that "L.O.T." recently exchanged sixteen old Junker machines—some dating back to 1922—for a new Ju-52, which will be delivered in July or August.

ON BOARD the HINDENBURG

Last week the new Zeppelin made her first North Atlantic trip. These photographs, taken by a passenger on the initial South Atlantic flight, show (left) members of the mooring party at Rio; (below) forty post-prandial winks in the sunny saloon; (bottom) Capt. Lehmann plotting a course; and a striking engine gondola impression. A detailed and fully illustrated description of the ship appeared in *Flight* of March 5 and 12.



Forthcoming Events

May 15-June 1. Stockholm Aero Show.
May 23. Empire Air Day.
May 27-June 4. Austrian Aero Club: Whitsun Tour.
May 29-June 2. Swiss Aero Club: Whitsun Tour.
May 30-June 1. Isle of Man Air Races.
May 30-June 1. Aero Club de Provence: Marseilles Week-end.
May 30-June 2. Yorkshire Gliding Club: Open Meeting and Competitions.
June 6. R.A.F. Flying Club: Annual Display.
June 6-14. Czechoslovakia Aero Club: Tour.
June 7. London Air Park Club: Hanworth Garden Party.
June 13-14. Opening of Brighton, Hove and Worthing Airport. International Rally.
June 20. Brooklands "At Home."
June 27. Royal Air Force Display, Hendon.
July 2-5. Belgian Aviation Clubs; Tour Aerien Belgique.
July 10 and 11. R.Ae.C.: King's Cup Race.
July 18. Portsmouth Aero Club: Isle of Wight Race.
July 23-26. R.Ae.C.: Week-end Aerien.
August 1. Cinque Ports Club: Folkestone Trophy Race.
August 1-3. Yorkshire Gliding Club: Open Meeting.
August 2-15. Yorkshire Gliding Club: Instruction Camp.
August 3. Ramsgate Airport: *Pou-du-Ciel* Race.
August 8. Reading Aero Club: Northesk Cup Competition for Women Pilots.
August 15-30. Yorkshire Gliding Club: Open Meeting and Competitions.
August 29-30. Cinque Ports Club: International Rally and Wakefield Cup Race.
August 30. Gordon Bennett Balloon Race, Poland.
September 5-6. Aero Club of Hungary: Week-end Aerien.
September 12. London Aeroplane Club: Hatfield Garden Party.
September 13. Aero Club de France: Coupe Deutsch Race.
September 20. London Air Park Club: Display.
October 25. Aero Club de France: Saigon Race.
November 13-29. Fifteenth International Aero Exhibition, Paris.

How Gunnery and Bombing are Taught: Theory and Practice at Eastchurch

"Snap-shooting": camera-gun practice with a Hawker Hart as target. Flying kit helps to simulate air conditions. (*Flight* photograph.)

THE AIR ARMAMENT SCHOOL

COMPETENT authorities of every air service are disputing on the question of aircraft armament. Whatever the outcome of their deliberations, it seems certain that the next few years will see some radical changes in the arming of aeroplanes for both offensive and defensive purposes.

The Royal Air Force does not make a practice of adopting unproven equipment, and is not likely to standardise any new-type weapon simply in order to come into line with certain Continental powers.

In any case, the whole armament question is in a nebulous and unstable condition, and until there is some radical change in policy the Royal Air Force must be trained to the highest pitch of efficiency in the use of the machine gun and the bomb as we know them to-day—and as we have known them since the war.

That training is largely given at the Air Armament School at Eastchurch, on the Isle of Sheppey, Kent.

The School is under the command of Group Captain C. W. H. Pulford, O.B.E., A.F.C., and is divided into four sections. One squadron (the term is purely one of convenience, and has no operational significance) is designated "A," and deals with ground instruction preparatory to practical work in the air with "B" squadron, housed near by. The third division—"C" Squadron—embodies the station H.Q., workshops, offices, transport section, and other auxiliary services. Finally, there is a Boys' Squadron which watches welfare and discipline.

The courses provided include one for Specialist Armament Officers, which occupies a year; another known as the Advanced Specialist Armament Course (this is of two years' duration, and comes chiefly under the Educational Section); and the Senior Armament Instructors' Course, which has been instituted to train senior N.C.O.s to act as armament instructors in squadrons.

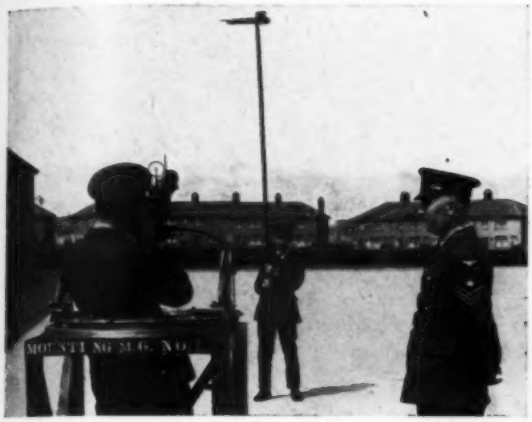
The fact that there are sixty-six classrooms and about the same number of instructors—some of them civilians with Service experience—gives some indication of the amount of work done.

Flight's recent visit to Eastchurch was made in connection with Empire Air Day on May 23, when the public will be privileged to see how this great, rambling station produces gunners, bomb-aimers, and armament specialists for the R.A.F.

To describe all the equipment necessary—and every bit of it is of absorbing interest—is quite out of the question. The devices for teaching the theory of gun-sighting and bomb-dropping would require a volume to themselves.

The armoury is a most unexciting building—viewed from without. Its spotless interior, however, is generously lined with small arms ranging from pistols to machine guns. The

Home on the Range: Next to the sergeant with the target control gear is a Scarff ring with Lewis gun and beyond that a rocking fuselage for training with the fixed Vickers' gun



A pole target for camera-gun practice. (*Flight* photograph.)

.45 Webley revolver and the Colt automatic pistol of similar calibre are standard equipment; the American Colts, which are issued to officers, were purchased as an emergency war-time measure. Short Lee-Enfield Mk. III rifles of standard Army pattern are, of course, provided for ground service. Incidentally, these are not issued to each man on his entry into the Service and retained by him during all his travels, as is the Army procedure, but are handed out when necessary.

Facilities for using pistols, rifles, and machine guns are not scarce at Eastchurch. The Lewis type is often mounted on a Scarff ring to simulate aerial firing conditions, and the Vickers is fitted to a rocking fuselage to train pilots in its use. There are targets off the coast for practice from the air with live ammunition.

In one hangar is an array of bombs, a number of them being sectioned for instructional purposes. Towering above all is a gigantic projectile weighing 3,000 lb. This, and certain others of its family, were to have dropped in at the Krupp factory at Essen in 1918. The Armistice prevented their visit.

H.E. Bombs

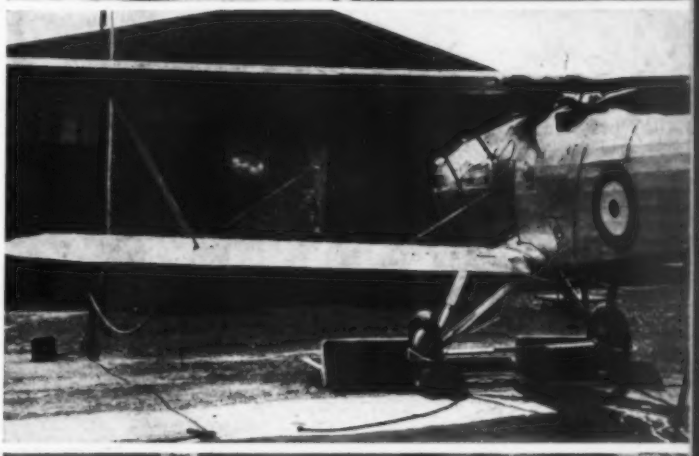
Sectioned bombs show the proportion of space occupied by explosive and the position of fuses. It is not generally realised that a typical 500 lb. bomb carries as much explosive as a 1,600 lb. naval armour-piercing shell. The thick case of the latter precludes a very large bursting charge.

Firing and bombing from the air is normally done from Hawker Harts (525 h.p. Rolls-Royce Kestrel), but there are a few Bulldogs and Wapitis in addition to these machines. The bombing is of the dive and horizontal, or "precision," varieties, and is done with small smoke-producing practice bombs against a target moored out to sea off Leysdown.

At 8,000 ft. in the prone position on the floor of a Hart flying at the apex of a tight three-machine "V" (with one's face over the open bomb-sighting door in the bottom of the fuselage, with the pilot's feet on the rudder bar just overhead, with a bomb sight, altimeter, and A.S.I. over the open panel, and with the undercarriage just below), one can lie in comparative comfort and watch a salvo of white practice bombs from the time they leave their rack till, streaking down toward the cold, murky sea, they throw up their plumes of smoke. It makes a picture not easily forgotten.

To provide a target for camera guns, a Hart or Bulldog dives and zooms over the emplacements—wooden framework with Scarff rings. This is likely to be one of the items to be seen on Empire Air Day.

May 23 at Eastchurch should prove entertaining and profitable for many a visitor. H. F. K.



Top to bottom: Precision bombing by Harts over the Leysdown target (note the bombs near the bottom centre of the picture); stripping pilots' machine guns; a Hart testing its Vickers gun at the stop-butts: and fusing live bombs in a roped-off enclosure out on the aerodrome. (*Flight* photographs.)

On the grand scale—a Saro London in the 140 ft.-wide doorway of the main erecting shop at Cowes; the interior, with partially built Londons amid the erecting scaffoldings, is seen at the foot of this page. (*Flight* photographs.)

FLYING-BOAT PRODUCTION

Meeting the Demands of the Expansion Programme in the Large-scale Manufacture of Big Aircraft : Some Notes on Building by "Rationalised" Methods in a Plant Ideally Equipped from the Outset

By G. F. ANDERSON, M.I.Mech.E. (Works Manager, Saunders-Roe Ltd.)

GIVEN an ideal geographical situation, with broad slipways reaching down into the waters of the Solent, and with a modern works recently described as "one of the biggest aircraft construction sheds in the world"—what of the works organisation and production methods necessary to fulfil the requirements of aircraft expansion programmes of to-day?

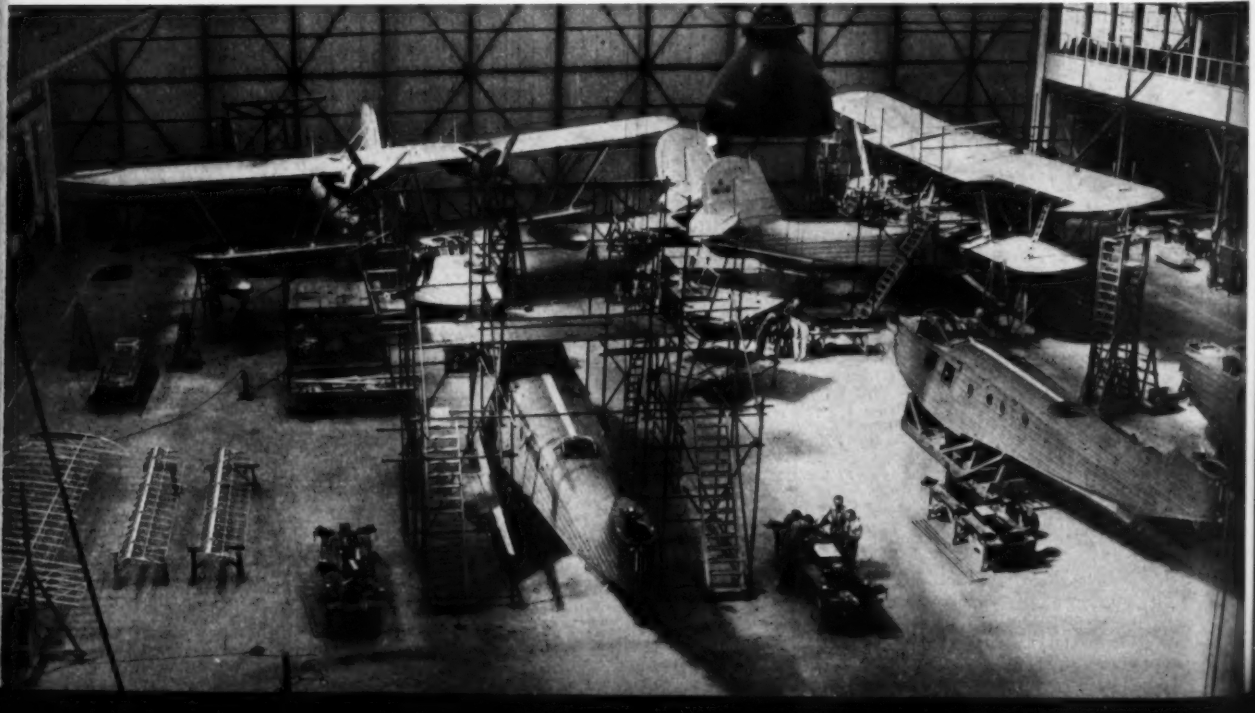
It is certain that the special problems facing the flying-boat manufacturer must be appreciated at the outset if initial layout and production facilities are to be clearly visualised and the production correctly planned and pursued to maximum achievement.

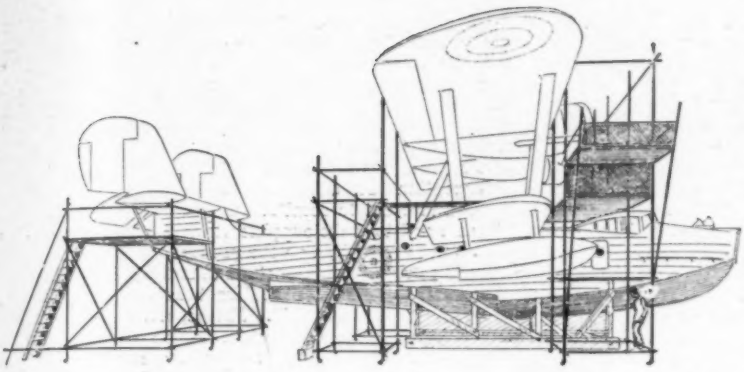
Unfortunately for the flying-boat manufacturer, few of the normal productive facilities and methods are easily applicable to an intensified expansion in large aircraft construction, although the application of improved methods and new materials should contribute largely towards the required acceleration in the immediate future.

In the Saro works the main aircraft sheds are situated on either side of the mouth of the River Medina, the extensive machine manufacturing and erecting shops for new aircraft production being on the east side, with the service erecting and testing shops on the west side. Finished flying-boats are launched from the production slipway, turning into the Solent for flight trials, and returning to the service slipway for final inspection prior to delivery. The intervening water area between the east and west sheds is well marked by numerous buoys and is actually regarded as part of the works productive area in final handling of completed flying-boats.

A definite slipway procedure is carried out for launching and handling in conjunction with Saro-built motor launches, whilst refuelling scows and slipway pier pumps keep in step with essential equipment features in the works proper.

Since the launched output of flying-boats and amphibians for Service or civil use is the determining capacity consideration from the productive standpoint, it will be con-





The layout of the steel erecting scaffolding described by the author. (Below) Subsidiary shops are laid out for progressive "line" production of components.

venient to trace back from the slipway some of the principal works departments.

The erecting shop layout and equipment is designed to secure intensified flying-boat erection at an output rate approximately ten to twelve times higher than that of pre-expansion days. With its main 40ft.-high door giving a clear width of 140ft. to the slipway, the erecting floor provides room for simultaneous erection of a dozen big boats. The slipway erecting berths are at present occupied with aircraft to an Air Ministry order for the Saro London.

Line Production

Line production is in full operation. The hulls travelling from the construction department follow a definite path, being moved between completion stages at regular intervals, when they receive covered components, internal fittings, engines and airscrews, and emerge *via* the weighbridges to the concrete apron for engine run.

From here the completed boats are launched with the aid of an electric winch for flight trials. The erecting shop embodies the most up-to-date conceptions to ensure perfect lighting conditions in the day, whilst a modern "Osira" electric discharge illumination is general for night working.

To facilitate expeditious handling and erection of large covered units, longitudinal and cross traverse electrical cranes of latest types are placed for operation from floor level and to enable withdrawal from dope shop for assembly straight to the machines under erection.

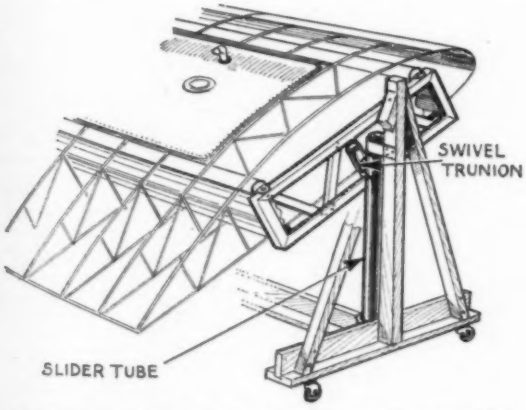
An interesting example of the application of new methods and employment of modern constructional materials is provided in the first use by Saunders-Roe of tubular steel scaffolding poles, couplings, swivel connectors and castors, etc., as illustrated in the first of the accompanying sketches. The older methods employed in erection of large aircraft involved the use of builders' and decorators' poles, trestles, and heavy planking, which was attended with considerable danger.

In considering the greater security of workers operating in different positions and at considerable heights the aim was to provide the maximum of confidence and security to fitters, erectors, riggers, etc., in the interests of efficient and more rapid production. An exact scale model of the aircraft was prepared, with model platforms and workers to the same scale, and after full consideration in conference with interested employees a model system of steel erecting staging platforms and connecting gangways was devised. This was worked out in standard steel scaffold materials and fittings, the entire structure being mounted on castor wheels to enable sections to be readily moved when the machine was completed. Complete

fitters' benches with vices are accommodated high up on the work platforms near to engine mountings, thus enabling all kinds of fitters' bench work to be carried out *in situ*, with considerable time-saving as compared with the older method of repeated returns to ground level. The strength, steadiness and rigidity of steel staging has been amply confirmed by the absolute confidence of workers, and by the quickness and ease of their movements in transferring to all parts of the machine.

A parallel case may be found in the use of steel scaffold tubing, and particularly its extension to experiments in all forms of carrying frames, to provide maximum accessibility during erection. One example is shown in the second sketch; the sub-assembly on this particular covered component is completed with the aid of a swivelling stand, enabling the unit to travel through 360 degrees and permitting adjustment for fixing at any desired position to complete particular sections of work. The swivel trunnion "S" is formed from a standard swivel connector and the slider tube "T" of steel scaffold pole. The freedom with which the component can be positioned for convenient working has been found to produce a marked effect on the quality and speed of operators' work.

Numerous combinations of frames for expeditious handling of wing components in production have been made up by use of tubular steel scaffolding and coupling units, and, where tried out and proved, these have formed the basis for construction of permanent stands or frames.



Another Saro time-saver: One of the trunnions on which large components, such as wings, are supported in order that they may be instantly turned over to any required angle.

Turning now to the hull construction shop, full use has been made of the diagonal "car-parking" method of laying keels, and from the battery of hulls lying in close juxtaposition at an angle of 45 degrees to main shop gangway, any one can be conveniently withdrawn.

All sections for hull construction are formed from strip by the draw-rolling method, standard interchangeable rolls being used which permit sections of any dimensions to be produced within the capacity of the machines and with the use of the minimum number of rolls.

As in other main works buildings, considerable importance is attached to the careful layout of productive areas by means of well-defined gangways linking up with correct operational sequence and production flow between adjacent departments. Among the latter may be mentioned heat treatment and special process rooms, anodic department (with cadmium and degreasing plant), and modern paint shops replete with special booths and spraying apparatus for the application of protective finishes.

Metal Spraying

A large detail fitters' department is located alongside hull construction and process sections, and separate view rooms are placed in special positions to ensure inspection at all stages without interruption of the logical flow of work. Metal spraying in its most modern applications has been developed in a special department adjacent to a shot-blast room, and the process is successfully applied to the protection of ferrous components, such as exhaust manifolds, collectors, etc., and in the preparation of non-slip roughened surface for walkways or platforms.

In connection with the latter, experiments carried out to enable the metal spraying of non-slip walkways *in situ* on the aircraft have resulted in the development of a complete portable metal spraying plant carried on a loose stillage which can be immediately picked up and transported by Lister truck and left at any desired location where the work is in progress. This apparatus embodies both sandblast and spraying equipment.

The machine shop provides for a progressive layout in which raw material enters at one end, passing through machining and inspection processes to emerge as finished components. The machine tool plant has been arranged in batteries of similar machines, each battery having its own setter and complete range of equipment. To provide for correct classification and organised handling of various machined components during manufacture, work stands are provided for each machine, while all work passes through the machine sections in standard pressed steel trays and containers to the main view room conveniently situated midway on the production floor for process inspection.

Stellite cutting tools, found by exhaustive experiment to be the most efficient, are standardised and cutting speeds in the order of 110 ft. per minute have been maintained on stainless steel. Screwing at 60 ft. per minute is achieved with the aid of Landmatic equipment, Dixol coolant being used for all turning, screwing and forming.

Jig boring is carried out on Thiel Universal mills. Hole centres, with the aid of slip gauges, are regularly held to within plus or minus 0.0005 in. All plug and ring, snap and slip gauges for use of works and inspection are ground on most modern universal grinding equipment, and finally hand lapped to size.

In the press department much thought and development has been extended to the forming of large panels in small quantities, and an economical solution has been reached by the use of hardwood drawing dies faced with cold rolled steel. These, equipped with a hand-operated pressure pad, are used on the 150-ton press, the floor to floor time being approximately 20 minutes. Domed tank ends 6 ft. long, with a large flange all round, are regularly produced.

Refrigeration of dural rivets has been successfully developed in order to combat wastage due to repeated heat treatments and to make supplies of conditioned rivets available at particular points on the production floor. Standard household refrigerator cabinets modified by the addition of an external thermometer are kept at a temperature of minus 15 degrees centigrade. Rivets, normalised in a salt bath at 490 degrees centigrade, which will age harden in two hours, may be kept in a working condition for sixteen hours by use of the refrigeration method described.

In the mechanical test laboratory, testing is carried out with a strict impartiality on raw materials and new constructional arrangements. The equipment includes Brinnell and Rockwell hardness-testing machines, lever arm and other special test machines, and an Izod impact testing machine.

A central feature of the laboratory is a modern Avery 20-ton direct-reading hydraulic universal test machine for tensile, compression or deflection tests. This machine is also equipped to carry out tests of special specimens and rigs. Other equipment provides the usual facilities for metallurgical research. In a separate experimental laboratory there is a large specially designed testing rig capable of carrying out the usual tests on hull or wing structures.

The co-ordination of executive functions and the welding of an efficient team, each member of which is a positive progressive unit, goes without saying, whilst in a time of abnormal expansion many problems will arise in the endeavour to absorb and train the necessary additional labour, unused to aircraft work, which alone will call for special understanding and patience on the part of executives during probationary or training periods.

Even where equipment is of the finest, the success of an organisation is the measure of the effective pull of the productive team, which must be counted specially important in its contribution to the future expansion of the industry.

Saro Works Contractors

In addition to the machine equipment firms mentioned by Mr. Anderson in his article above, the following, by the parts they have played in the erection of the works, have contributed to the successful production methods described:

Boulton and Paul, Ltd., Norwich, *structural steelwork and building*; Sturtevant Engineering Co., Ltd., *heating and ventilating*; General Electric Co., Ltd., *lighting equipment*; Alliance Electrical Co., Ltd., *installation of lighting and power service*; Holst and Co., Ltd., *reinforced concrete foundations and slipway*; Pinchin, Johnson and Co., Ltd., *vigorised red lead primer paint*; Cellon, Ltd., *finishing paint*; Hills Patent Glazing Co., Ltd., *roof lighting*; Williams and Williams, Ltd., *metal windows*; Rollo Products, Ltd., *dustproofing and hardening*.

The consulting architect was Mr. A. Victor Heal, F.R.I.B.A., and the consulting engineer Mr. T. L. Bonstow, M.Inst.C.E.

A good idea of the extent of the works may be obtained from the aerial view—an R.A.F. official photograph—which appeared in the centre pages of last week's issue.

R.Ae.S. GARDEN PARTY GUESTS

THE foreign representatives and high officers of the Royal Air Force in the list of guests at the R.Ae.S. Garden Party (reported on pages 500-502) included the following:—

Capt. de Corvette Albertas (French Air Attaché); Capt. Natal Arnaud (Acting Naval Attaché, Brazilian Embassy); Major D. Carmelo de las Morenas Alcala (Spanish Air Attaché); Monsieur H. C. Berg (Norwegian Counsellor); Prince Otto Von Bismarck (German Counsellor); Air Marshal Sir F. W. Bowhill (Air Member for Personnel); Col. A. Calderara (Italian Air Attaché); Sir Hal Colebatch (Agent-General for Western Australia); Air Vice-Marshal C. L. Courtney (Director of Operations and Intelligence and Deputy Chief of Air Staff); Mr. John W. Dulanty (High Commissioner for the Irish Free State); Air Chief Marshal Sir Edward L. Ellington (Chief of Air Staff); Col. G. Gervassy (Assistant Air Attaché, Soviet Union); Comdr. H. Grondahl (Finnish Naval Attaché); Col. J. A. dos Santos Lucas (Portuguese Embassy); Mr. W. A. McAdam (Agent-General for British Columbia); Mr. C. F. G. McCann (Agent-General and Trade Commissioner for South Australia); Corps Comdr. V. K. Putna (Air and Military Attaché, Soviet Union); Sir Philip A. G. D. Sassoon, Bart. (Under-Secretary of State for Air); Col. M. F. Scanlon (American Assistant Military and Air Attaché); Lt.-Col. Sir Francis C. Shelmerdine (Director General of Civil Aviation); Lt. Comdr. L. C. Stevens (Assistant Naval Attaché for Air, American Embassy); Marshal of the Royal Air Force Viscount Trenchard; General R. Wenninger (German Air Attaché); Major L. F. E. Wouters (Belgian Air Attaché).

THE STOCKHOLM EXHIBITION

Sixteen British Firms Exhibiting : A "Model" Show : Engine Firms Showing Enterprise

OPENING to-morrow, May 15, and continuing until June 1, the second Swedish International Aero Show will be held in Stockholm. The exhibition will, like the 1931 show, be staged in the hangars at Lindarängen, the civil seaplane airport of Stockholm. Exhibitors of seaplanes will be at an advantage in that they can fly their machines direct to the scene of the exhibition, while landplane exhibitors will, owing to delay in finishing the new airport at Bromma, have to use a certain amount of road transport. The exhibition will be officially opened to-morrow afternoon, and the Bromma airport will be inaugurated on May 24. The letters "I.L.I.S." will be a familiar sight to all visitors to Sweden during the next fortnight, so it may be of assistance if it is explained that they are the initial letters of the Swedish name for the show, Internationella Luftfartsutställningen i Stockholm.

Sixteen British firms, manufacturers of aircraft, aero engines, materials and equipment, will be represented at the exhibition, and in addition several firms will have demonstration machines at the airport when that is opened. On May 25 particularly one may expect to see a number of British types at Bromma, as that is the date set aside for official demonstrations.

It would appear that the Percival Aircraft Company will be the only British firm to show a full-size machine. Capt. Percival will exhibit his latest type, the Vega Gull four-seater, with De Havilland 130 h.p. Gipsy Major engine.

Handley Page, Ltd., will exhibit a scale model of the H.P.53 twin-engined bomber which the firm is building for the Swedish Royal Air Force. The machine is a monoplane of very clean design and is fitted with leading edge slots and slotted trailing edge flaps. The machine guns are installed in enclosed cockpits to enable the gunners to operate the guns while the machine is flying at high speed. A working model showing the operation of the automatic wing slot will also be on view, and a model of the Handley Page electrical bomb release gear.

Pobjoy Airmotors & Aircraft, Ltd., will show on their stand a model and photographs of the Short Scion.

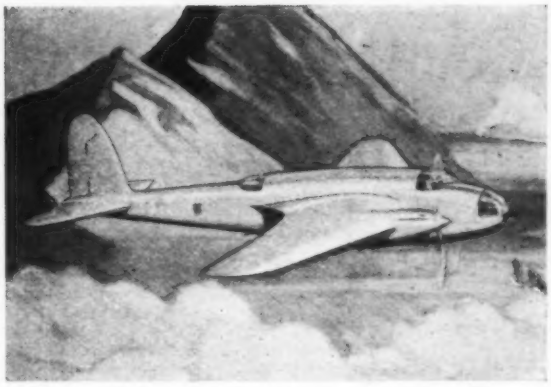
Engines at "I.L.I.S."

On the whole, British aero engine firms promise to uphold British prestige far better at Stockholm than will the aircraft firms. No fewer than seven British aero engine firms will have stand space, and they will not content themselves with models and photographs, but will exhibit actual specimens of their products. There can be no doubt that the reputation of British aero engines, already extremely high, will rise even higher as a result of the "I.L.I.S."

Armstrong-Siddeley Motors, Ltd., will show three types: The fourteen-cylinder Tiger VI of 760 b.h.p. at 5,000ft. (actually develping a maximum of 810 h.p. at 6,500ft., and giving 840 h.p. for take-off); the 355 h.p. Cheetah IX and the 150 h.p. Genet Major IVa.

The Bristol Aeroplane Co., Ltd., will also show three examples, all of the nine-cylinder radial air-cooled type. The Mercury VIII of 840 h.p., specially designed for high-speed military aeroplanes; the Pegasus X of 820-920 b.h.p.; and the Aquila sleeve-valve engine.

The De Havilland Aircraft Co., Ltd., will confine themselves to a single type, the 200 b.h.p. six-cylinder Gipsy Six. There will doubtless be De Havilland engines in many of the aircraft to be demonstrated at the aerodrome.



A SUCCESSOR TO THE HEYFORD? A conception, from *The Handley Page Bulletin*, of a future H.P. bomber. The machine seems to be somewhat similar to the H.P.53 type (a model of which will be exhibited at the Stockholm show) ordered by the Swedish Royal Air Force and appears to have liquid-cooled Rolls Royce engines. Note that the mid-wing arrangement has been adopted, probably resulting from internal bomb stowage.

D. Napier & Son, Ltd., will show a complete twenty-four-cylinder "H"-shaped Dagger engine and a case of component parts for the Rapier. A large number of Daggers have been ordered for installation in the Hawker Hector for the British Royal Air Force.

Pobjoy Airmotors & Aircraft, Ltd., will be represented by a Niagara III of 88-95 b.h.p. and a Cataract III of similar power. Parts will be on view in a showcase.

Rolls-Royce, Ltd., will exhibit the latest model of the famous liquid-cooled Kestrel twelve-cylinder vee engine. This engine delivers a maximum of 745 b.h.p. at 14,500ft., and is rated at 690 b.h.p. at 11,000ft.

Wolseley Aero Engines, Ltd., will be well represented by four types: The seven-cylinder Aquarius of 155-170 b.h.p.; the nine-cylinder Aries of 208-225 b.h.p.; the 255-290 b.h.p. moderately supercharged Scorpio II, also a nine-cylinder, and the new Libra moderately supercharged engine of 440-505 b.h.p. The Libra gives its maximum output at 7,200ft.

British Equipment

British manufacturers of materials, instruments and components who will be exhibiting at Stockholm are seven in number. Brief details of their exhibits are as follows:—

Dunlop Rubber Co., Ltd.: Aeroplane tyres and wheels; electrically conductive tail wheels; streamline landing wheels; pneumatic and hydraulic brakes for aircraft.

Negretti & Zambra: Air and oil temperature thermometers; oil and fuel pressure gauges; radiator thermometers, and engine recording devices.

The Palmer Tyre Co., Ltd.: A range of aeroplane wheels and tyres, including electrically conductive tail wheels; pneumatic and hydraulic controls for brakes.

Short & Mason, Ltd.: A display of aircraft instruments, including compasses, turn-and-bank indicators, laboratory testing apparatus and a range of meteorological instruments.

Smith's Aircraft Instruments: A very large range of aerial navigation apparatus, automatic pilot, radio equipment, compasses, wing-tip flares, landing lamps, spark plugs and insulating screens, and electrical fuel contents gauges.

Standard Telephones & Cables, Ltd.: Radio transmitters and receivers and a radio direction-finder.

Wellworthy Piston Rings, Ltd.: Piston rings for all types of aero engines, made in a special material invented and patented by the company.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

LANDING FEES

I WAS interested by the letter from Mr. E. W. Walford regarding the landing fees which are now being charged by many aerodromes, and pleased to see the level-headed reply by "Indicator" in his "Topics of the Day"

I feel sure Mr. Walford must agree that it will be a real step forward in the development of flying when airports are put on a sound commercial basis. There is, at present, a sad lack of ground equipment in all parts of the country, and we can scarcely hope that the necessary facilities will be supplied by a band of millionaire philanthropists.

In the past, as Mr. Walford says, private pilots have landed on three or four aerodromes during a day, sometimes spending little or nothing When one considers the considerable cost of upkeep and the capital involved, it is little wonder that airports are now introducing small landing fees. With these fees at their present low level, there is no reason for a grouse, and we should feel none the less grateful to those pioneers who are supplying that equipment which is aviation's most urgent need. C. A. HERRING.

London, S.E.22.

THE LIGHT BRIGADE

IN reply to Mr. Stephan's attack (April 30) on ultra-light aeroplanes I would first point out that Mr. Stephan quotes an opinion which he gave some fifteen or sixteen years ago; and, therefore, I would ask him to become conversant with the *modern* ultra-light machine

Your correspondent refers to flying as a sport, providing the satisfaction of a difficult feat well done. Nice-weather flying to the embryo pilot *is* a difficult feat well done. Mr. Stephan points out that this becomes boring. Aerobatics and rough-weather flying, to the experienced pilot, are also a difficult feat well done; but may I point out that this might also become boring?

I am quite sure that Lord Sempill probably got a far greater thrill flying a Drone to Berlin than by going in an ordinary club or touring aeroplane. The same with Mr. Appleby on his flight to France in a *Pou*, so if it's release from boredom your correspondent wants let him take up ultra-light machines.

Mr. Stephan wants a fast touring machine in which he can "hedge-hop", all I can say is good luck to him, and I hope he has a good time in hospital.

He also wants a nice helicopter. So far, I have yet to see one suitable for his purpose. I would advise him to buy a nice ultra-light machine which will take off and land in a medium-sized field, as many will do, *d.v.*, and farmers permitting.

Prenton, Cheshire. F. MUNRO DINGWALL.

THE NOISE NUISANCE

UNDER "The Outlook" on page 453 of the April 30 issue of *Flight* appears a note which, in my humble opinion, takes altogether too narrow a view of the noise problem.

Never let it be said that flying folk have taken up much the same attitude to public good manners as have users of the roads It is a painful fact, and one which will take a lot of living down, that practically all the associations representing motorists, cyclists, and pedestrians have done everything in their power to baulk the efforts of those striving to lessen danger and noise on those roads.

Nevertheless, the "old noises of the road" of which you speak are now being decreased forcibly instead of by voluntary effort. The clanking tramline will have gone at the end of another two years, and so will the excessively noisy motor cycle and sports car.

Now, we of the aircraft industry spend most of our time night or day with aircraft continually flying about our ears. To most of us, myself included, the sound of a healthy aero-engine is music indeed—but there is music *and* "music.

Personally, I find the sound emitted by the H.P.42, the Short Scylla, and the Douglas D.C.2 very pleasant All these machines have reasonably quiet cabins as well, and still manage to be truly commercial aircraft. These remarks apply equally well to the Heston Phœnix, this being rather remarkable for a single-engined type.

So far so good; but the Fokker F.22 and F.36 and the big Savoia, taking off, make me sympathise wholeheartedly with those householders who would like to keep a 3in. H.A. gun in the back garden for use on these occasions for self-defence.

I am affected in similar manner by all aircraft using only stub pipes, particularly when fitted to engines having only two to four cylinders. In any case, a school machine which is engaged in trundling around the same old plot of land day after day should obviously be reasonably unobjectionable if complaints are to be avoided. This is certainly not the happy state of things at one or two aerodromes at present, but it will come just as soon as sufficient pressure is brought to bear upon the operators. Such is human nature.

North Harrow. CLEMENT G. W. EBBUTT.

THE PEREGRINE AND ITS PASSENGERS

WE were most interested in the description of the Miles Peregrine in the April 23 issue of *Flight*. Undoubtedly Mr. Miles has designed a quite exceptionally good aeroplane, but there seems to be one difficulty.

Mr. Miles' Gipsy Sixes are not nearly as thirsty as those we are used to, but taking his figure of 5¾ hr. at 17.5 galls. per hr. and using very light petrol (7.4 lb. per gall.) gives 744 lb. of fuel. Add 74 lb. of oil (at least), two pilots at 170 lb., and 3,200 lb. of Peregrine, and we have a total of 4,358 lb. This leaves 642 lb. for six passengers and their luggage—107 lb. each.

Will Mr. Miles be able to provide operators who purchase his machine with an adequate supply of these 7½-stone passengers? A. A. BAGE.

London, S.W.1. A. A. FLETCHER.

[We have queried Mr. Miles, who states that some "most optimistic" figures estimated long before the machine was designed had been inadvertently supplied and combined in one specification. The correct data, he states, should be as given below.—ED.]

	lb.
Tare weight (not including special equipment) ...	3,600
All-up weight	5,200
Disposable load, therefore	2,200
Then we have:—	
Crew	340
Petrol (standard 60 gallons—tankage allowed, 80 gallons for long distance on smaller loads)	450
Oil (5 gallons)	50
Total ...	840
Balance available for passengers and extra equipment	1,360
6 passengers at 160 lb.	960
Luggage at 30 lb. per passenger	180
Total ...	1,140 lb.

Which leaves 220 lb.

FLIGHT

NEXT WEEK

NEXT Thursday's issue of *Flight* will be a Special Number devoted to modern developments in commercial aviation. British commercial aircraft types, from the small charter or taxi machines to the largest liners, will be reviewed and illustrated, and articles on radio control, the future of the Empire services, and a number of other important aspects of commercial flying will be included.

COMMERCIAL AIRCRAFT and AIRLINES

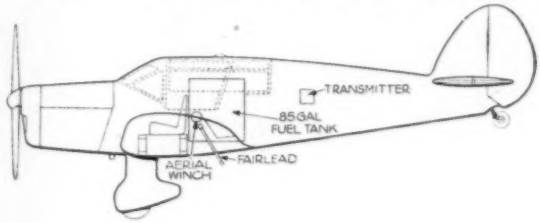
TO the CAPE in 78 HOURS

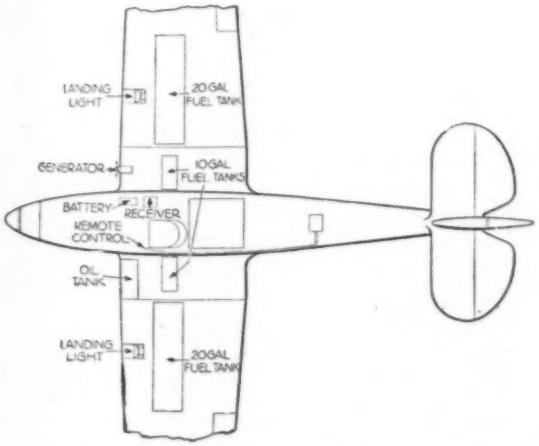
Mrs. Mollison Beats the Existing Time by 11 hrs. 9 mins. More Laurels for the Percival Gull and D.H. Gipsy Six

BY covering the 6,700 miles between Gravesend and Capetown in 3 days 6 hr. 26 min. Mrs. Amy Mollison has broken the record for that journey (set up by Flt. Lt. "Tommy" Rose in a Miles Falcon Six) by 11 hr. 9 min., flying a Percival Gull with a De Havilland Gipsy Six engine. Whereas Flt. Lt. Rose took the East Coast route down Africa, Mrs. Mollison kept to the West Coast, saving about 700 miles. As we go to press Mrs. Mollison is fast nearing home on the return journey.

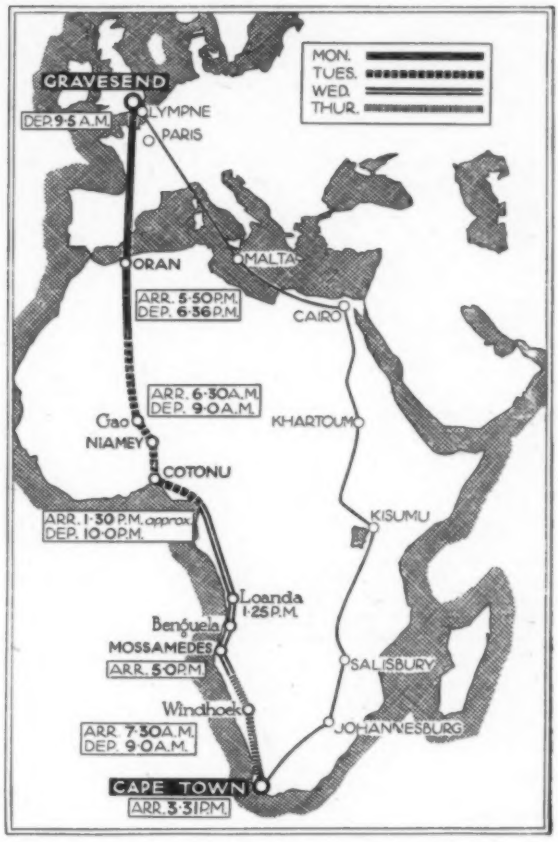
Perhaps the most laudable feature of the outward flight was the 2,000-mile crossing of the Sahara Desert, flying blind and by night. A Marconi A.D.51/20 installation kept her in touch with the world.

Mrs. Mollison was prevented from keeping to the schedule she had set herself by the fact that inadequate aerodromes made it impossible for the Gull to take off with full tanks. A 270-mile detour to Cotonu also added considerably to her time.





The distribution in the Gull of the tanks which gave a 2,400-mile range.



This map offers a comparison between the routes of Mrs Mollison and Flt. Lt. "Tommy" Rose, the latter being indicated by a thin line.

Viscount Swinton, Secretary of State for Air, sent the following message to Mrs. Mollison at Capetown: "Hearty congratulations on your excellent flight."

At ten o'clock on Sunday night Mrs. Mollison took off from Capetown on the return trip. She was due at Salisbury at ten o'clock on Monday, but, missing that city, landed at Umtali on the eastern border of Southern Rhodesia. She left three hours behind her schedule and arrived at Mpika, Northern Rhodesia, at 4.40 on Monday afternoon. At 8.45 a.m. on Tuesday she had reached Mbeya, Tanganyika.

The equipment of the Gipsy Six Gull included the following: B.T.H. magneto, Claudel-Hobson carburetter, K.L.G. plugs, Tecalemit oil filters, Weyburn camshaft, Smith's engine instruments, Fairey metal airscrew, Shell fuel, Castrol oil, Smith's P.4 compass, Kollsman altimeter, Sperry artificial horizon and directional gyro, Marconi short-wave wireless equipment, Rotax generator, starter and battery, Demec navigation lights, Vickers landing lights and three-way petrol taps, Percival petrol tanks and undercarriage, Bendix brakes, Dunlop front tyres and wheels, Palmer tail wheel and tyre, Titanine dope, Rumbold upholstery, Splintex windscreen and windows, Bamberger spruce, and Flexo plywood.

Private Flying

Topics of the Day

This View Business

AFTER flying almost exclusively in cabin machines for a month or so I recently spent the odd quarter of an hour in what was once known as the conventional two-seater—to wit, a tandem-seater braced biplane. In many ways the experience resembled that of learning to fly all over again, since I was sitting very low in the cockpit and felt that the all-round visibility was unduly restricted.

The weather was fairly thick at the time, and, unless I was able to see all the three other machines in the air at the same time, my mental discomfort was considerable. During the final phase of each approach the machine was yawed in order to make quite sure that no other machine had taxied over the fairway, while the hold-off and landing was done entirely by feel and with no forward view whatever.

How on earth I ever learnt to land a machine of this kind fairly, squarely, and without drift, is a mystery which I do not feel capable of solving—particularly as the average pupil will not take the trouble to ensure that he is sitting sufficiently high in the cockpit. Some instructors, as a matter of fact, like their pupils to sit very low, partly so that they should become accustomed to this position, and partly because they have found that better landings are made—I don't know why.

The Modern Idea

THERE is no doubt, however, that the average pupil of to-day has been spoilt by odd passenger flights in cabin aeroplanes, and has learnt to expect a forward view which he certainly will not experience in the majority of training machines. Later on he settles down and forgets that from the driving seat of his car he can see everything in front of him. Aeroplanes, he thinks, must necessarily be different. That is not to say that all cabin aeroplanes have a good view forward. One or two of them frighten me so badly in heavy rain or thick weather that I long for the good old training type.

In this matter I am reminded of a statement made by at least two instructors when asked for their considered opinions on the side-by-side cabin trainer. Pupils, they said, can rarely be taught to keep their eyes open in the air and to watch for other machines on all sectors, and a cabin machine would naturally intensify this fault. On the contrary, I feel that the pupil who does not need to crane his neck in order to survey the essential parts of the sky is less likely to get into trouble, and is certainly more likely to see exactly where he is going wrong with his landings.

During quite half the period of *ab initio* training, landing and approach faults are simply not understood, and the movement of the throttle and stick preparatory to the business of "going round again" leaves a pupil's mind quite blank until the matter is explained in detail on the ground—when he has probably forgotten what he saw and felt. Shortage of cushions, a badly fitting helmet and a change of instructor must, between them, have once cost me a good many wasted training hours.

As a matter of fact, for reasons almost entirely connected with forward view, I had no difficulty at all with the very first cabin aeroplane I flew, despite the facts that no dual instruction was possible thereon, and that even the forward view would not be considered to be very brilliant in the light of modern ideas. This machine—a Desoutter—I have always looked on as one of the easiest and safest aeroplanes that has ever been produced. Possibly its "unfoldability" helped to ruin its chances. Another obsolescent machine, the Puss Moth, rivalled it for ease of handling, safety, and childishly easy landing.

Comparisons Again

ONE earnest reader has pulled me up for my remarks about relative costs. One can, he says, hardly compare relative "distance values," since both the car and the aeroplane are used by the private owner largely for pleasure, and, consequently, time rather than distance should form the basis of one's calculations. In that case, of course, the car comes out very well indeed—about 10s. an hour against 30s. for the aeroplane—but I was talking almost entirely of the aeroplane as a means of serious private transport.

Furthermore, if one is comparing pleasure values, I would much prefer to travel for twenty minutes in an aeroplane than for an hour in a car—much as I enjoy long-distance night driving. Not so long ago, after arranging to borrow an aeroplane for a fairly short cross-country journey, I was forced by weather conditions to make the journey by road.

The air journey would have taken a great deal less than half an hour, while the road journey occupied very nearly two hours, hampered as I was by slow lorries, crossing lights, and endless villages. It was a hot, dusty, and savagely boring two hours, which was made all the less bearable by the fact that the weather improved consistently.

I reiterate that flying is not cheap, and that it is not always useful, but when a machine can be obtained, and when the destination is conveniently placed in relation to an aerodrome, the additional cost is amply justified in reduced nerve strain, in increased comfort, and in the saving of time. As the Chinese potentate is reputed to have said, after being rushed in record time from the ship to the hotel in New York: "Now, what are you going to do with the five minutes that have been saved in this terrifying journey?"

INDICATOR.

FROM the CLUBS

Events and Activity at the Clubs and Schools

MIDLAND

MR. P. DANIELSEN has gone solo and Dr. Henderson and Messrs. J. A. Pullin and D. L. Lloyd have become members. Flying times for the month were 10 hr. 35 min. dual and 23 hr. 5 min. solo.

YORKSHIRE

Club machines flew 43 hr. 5 min. during the week ending May 8. On Sunday, May 3, the flying time was 16 hr. 50 min.

REDHILL

The Percival Vega Gull and the B.A. Eagle have been demonstrated. For the week ending Friday, May 8, the flying time was 87 hr. 55 min.

WITNEY AND OXON

Twenty-four hours' flying was recorded during the week ending May 9. Mrs. Hope Aspell became a pilot member and Mr. D. G. Biggart went solo.

LEICESTERSHIRE

The flying time for April was 120 hr. 30 min. On Sunday, April 26, the Club's president, Mr. W. Lindsay Everard, M.P., presented the Club with his D.H. Moth.

BORDER

April's flying time of 85 hr. 48 min. would have been considerably augmented had the B.A. Eagle not been unserviceable through engine trouble. Mr. Parry has joined the Club as an associate member. Three services, British Airways, Blackpool and West Coast Air Services and Railway Air Services, will be using the aerodrome during the summer.

CAMBRIDGE

The total flying time at Marshall's Flying School, Ltd., during the week ending May 9 was 169 hr. 45 min. (Doubtless this surprisingly high total includes charter and test flying.—ED.) Messrs. Abbot and Aidie went solo and Messrs. Miller, Lush and Elton passed their "A" licence tests. New members included the Hon. J. R. Scarlett and Messrs. Meyrick and Morris.

HERTS AND ESSEX

The flying time for March was 310 hr. 11 min. During the fortnight ending May 7, 196 hr. 54 min. was logged. This is an increase of over fifty hours compared with the previous fortnight's total. First solos were made by Messrs. W. A. Tyler, J. H. Short and Franz Morat, and Messrs. Goldsmith, Dutoict and Tyler passed the tests for the "A" licence. In the cross-country competition for the "Cads" tankard (open to pilots with under twenty hours' solo experience) Mr. E. G. Dineen gained most points and the trophy. Mr. W. Catton was second. Messrs. G. S. Fletcher, H. Dubery-Hamilton, P. E. Hindmarsh, R. O'Donnell, P. A. X. Gaugain, R. Wilde, A. A. Pollard, and R. T. Lang became members.

SOUTHEND

High winds curtailed flying time during the week, but over sixteen hours were recorded on Sunday, May 3. Mr. Prentice went solo, Mr. Wyborn took his "A" licence, and Messrs. Jarvis, Lintern, Lofthouse and Sarll became pupils.

NORFOLK AND NORWICH

Mr. D. Bradley-Watson and Mr. R. M. Mottram have gone solo. Among the visitors to the Club was Mr. Kaye Don, the racing motorist. Mr. Kaye Don, who served in the R.F.C. during the war, still takes a great interest in aviation, and has joined the Club.

PORTSMOUTH

The result of the monthly landing competition held on Sunday, May 3, was: (1) Mr. W. N. Davis, (2) Mr. E. R. Hills, and (3) Mr. R. H. Pilcher. Mr. J. H. Williams has gone solo. Flying times for the week ending May 8 amounted to 42 hr. 40 m. New members during that week were Miss Mona Rump, Messrs. R. Denzel, H. Y. Tench, H. Hayward-Jones, H. W. Westbrook, 2nd Lt. A. W. Rainey, R.M., and Lt. S. W. D. Colls, R.N.

HULL

Two Club records were handsomely beaten during April. On Sunday, April 26, sixteen hours were flown (all by two machines), the previous best time being ten hours. The total for the month was 99 hr. 5 min., which is 22½ hr. better than the previous best month in the Club's history. Messrs. H. J. Adams, J. C. Noble, A. Downs, and J. E. Kirk have gone solo and "A" licences have been gained by Messrs. O. Hellyer, J. C. Scarborough, J. C. Noble and H. J. Adams.

HANWORTH

A highly successful "dawn patrol" was held on Sunday, the aerodrome being "attacked" by fifty-one machines. Eight of these got through and their pilots and passengers were provided with free breakfasts. The aerodrome was defended by about fourteen machines under the leadership of Mr. D. W. Llewellyn, the long-distance record-breaking pilot. Flying times last week totalled 55 hr. 30 min. Messrs. F. C. Lawton and R. C. Cater became members; Mr. Noel Brown, the staff flying club, went solo; and Messrs. L. Hanney and G. Toth passed their "A" licence tests.

EDINBURGH

After a highly successful first year, when an average of seventy hours per month was maintained, the Edinburgh Club continues to progress. Flt. Lt. R. Duncanson is the new chief instructor and Mr. D. F. McCurrach, the late secretary, has joined the Committee of Management. He is succeeded in the secretaryship by Mr. H. R. Pattullo, 3, Glenfinias Street, Edinburgh. The officers of No. 603 City of Edinburgh (B) Squadron, A.A.F., Turnhouse, have presented trophy for a landing competition on May 30. An aerobatic competition has been fixed for June 20. The aerodrome will be open on Empire Air Day and R.A.F. machines are expected to look in during the afternoon.

FURTHER DEVELOPMENT: The Kay gyroplane, which was originally described in *Flight* of December 27, 1934, is out again for experimental work in its new form. It will be remembered that this machine has a unique method of varying the incidence of the blades and has been undergoing tests at Farnborough. (*Flight* photograph.)

Private Flying

PENANG

The total flying time for 1935 recorded by the Penang Flying Club was 1,871 hr. 20 min. Five machines were in operation.

LONDON

Messrs. G. Russell-Hay, A. R. Weyl and J. W. Woolley have gone solo, and Messrs. A. Denew, K. E. Buxton, R. A. Robertson, and J. C. C. Taylor became members.

TOLLERTON

Flying time at Tollerton for the week ending April 30 was 43 hr. 10 min., making a total of 133 hours for the month. Mr. S. J. Harris joined the Club as a flying member and Mr. J. F. Armitage went solo.

READING

New pupils include Mr. Brown and Mr. Palmer. Miss Peggy Salaman is staying at the Club and is taking a special refresher course. Mr. and Mrs. Miles have returned from Baden-Baden and Captain Campbell Black has visited the aerodrome. Last week's flying time was twenty-three hours.

YAPTON

The Yapton Aero Club, Ltd., has been placed on the Air Ministry list of approved blind-flying schools. It has purchased a Moth, bringing its fleet up to four machines. First solos have been made by Messrs. Swift Coleman and J. Heath. New members are Flt. Lt. Frank Jones and Mr. G. C. Matheson. Flying times from May 1 to 10 amounted to 25 hr 35 min.

LINCOLNSHIRE

In spite of low clouds a successful "Dawn Patrol" was held last Sunday, visiting machines arriving from Leicester, Nottingham, Sherburn and Hull. Mr. Grice is putting in some good cross-country work on his new B.A. Swallow. Jubilee Air Displays, Ltd., are visiting the Club's aerodrome at Waltham on Empire Air day. Mr. French has become a pupil and Mr. M. Forte has taken his "A" licence.

CINQUE PORTS

Mr. Drake, who is a member of the Penang Flying Club, is over here to purchase a new aeroplane for general transport purposes. Among other types in which Mr. Drake has interested himself is the Percival Vega Gull. Mr. Guy Prendergast has purchased through the Club a B.A. Swallow. Four Club machines set out on Sunday morning for the Hanworth Dawn Patrol, but were forced to abandon their trip through the weather conditions. New members last week included Messrs. H. A. E. Howey, D. B. Rooke, D. G. Walker, W. H. Johnston, P. E. Pettitt, and J. R. Robins.

A. S. T.

A record summer is anticipated by Air Service Training, Ltd., with their new three years' course for the training of commercial pilots commencing early in May. Seven new students arrived in April for various courses ranging from one month to three years' duration. They include Mr. Tata from India and Mr. Henze from Austria. During April the two candidates taking the first preparatory course for traffic control officers completed their training and obtained appointments straight away. Another such course for traffic control officers commenced on April 15. Two of the long course students, Messrs. Raubenheimer and Hall, passed the examination for the P.M.G.'s W/T air operators' licence. During the month 1,344 flying hours were completed. For the past three months, the second Air Service Training School has been operating at Southampton Airport, Eastleigh, but returned to its permanent station at Ansty, near Coventry, on May 4. The School's establishment has been completed by the appointment of Lt. Comdr. Cooper as Chief Ground Instructor, and of two flying instructors, Flt. Lt. P. V. Williams, recently flying instructor at the R.A.F. Cadet College, Cranwell, and F/O. E. S. Greenwood, who is also a C.F.S. Instructor and has just returned from the East.

BRISTOL

On May 5 several members had instruction in night flying and during the week two members completed a blind-flying course. Mr. J. W. Whitehead went solo. The flying time for the week was 46 hr. 45 min.

C. A. S. C.

This week-end members flew 3 hr. 20 min. solo and 2 hr. 30 min. dual. During the afternoon cross countries were made to Ipswich and Hatfield. Mr. L. Melyneux has resigned his membership on being posted to the R.A.F. Reserve.

SOUTH COAST

All the Club aircraft "attacked" Hanworth on last Sunday's "Dawn Patrol." No one succeeded in winning a free breakfast. Preparations are going ahead for the International Meeting on June 13 and 14, and a very good course for the South Coast Trophy Race has been fixed. The improved weather has increased flying hours to just over thirty. New members are Mrs. Womersley, Mrs. Rubie, Mr. and Mrs. Lyons, and Messrs. W. H. Cornelius, F. L. Chandler, and J. A. H. Greet.

BROOKLANDS

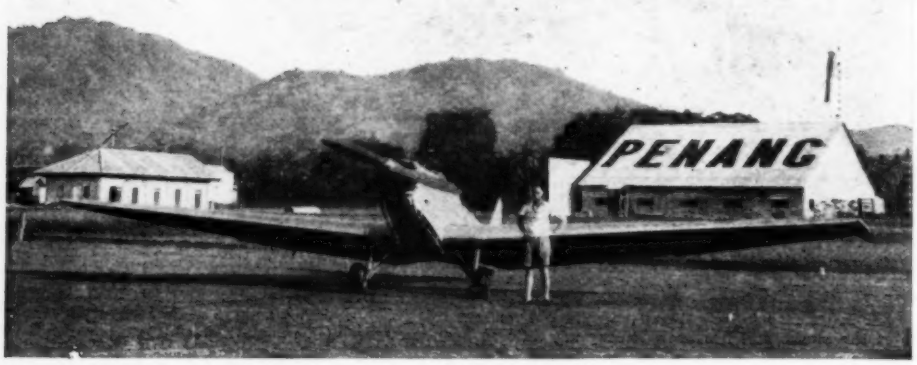
Flying hours were well up over the hundred mark again last week. New members include Messrs. P. D. Tayal, K. Ram, L. M. L. Berliner, S. Kasteliz, L. Denny and J. W. Burrows. Miss Young, Mr. Clifford Mollison, the actor, and Mr. U. Rusher have gone solo. The College of Aeronautical Engineering is building a D.H.56 from blue prints supplied by the De Havilland company. Messrs. D. R. Grant and W. H. Llewellyn, of the College, have passed their examinations for the Ground Engineers' "A" and "C" licences. The new Club Puss Moth is proving popular. Miss J. Oldacres and Messrs. T. Downing and J. A. M. Henderson have been taking a course of instrument flying with Captain Findlay. Seven Club machines took part in the "Dawn Patrol" at Hanworth on Sunday morning and the crews of two of them obtained breakfasts.

The Isle of Man Races

INTENDING competitors in the Isle of Man Air Races on May 30 and June 1 should remember that the entry list closes to-morrow, Friday, though late entries (at double fee) can be received until May 22. The organising secretary is Capt. R. H. Stocken, 18-20, Lower Regent Street, London, S.W.1 (Whitehall 8863).

Straight Miles

PHILLIPS AND POWIS sprang something of a surprise on visitors to the R.Ae.S. Garden Party last Sunday by bringing over the Miles-Whitney Straight Special. Rumour had been busy with the new machine, a large batch of which has been ordered by Mr. Whitney Straight, but little was known of its characteristics. The machine is a side-by-side two-seater, fitted with the De Havilland Gipsy Major of 130 b.h.p., and is intended for instructional work, dual control being fitted. The seating arrangement is very comfortable, and the production machine will have one long seat, with an armrest in the centre. The very large luggage space behind the seats will permit of carrying 114 lb. of luggage. A Rodoid windscreen of special shape and construction gives a remarkable view, and the performance of the machine is quite exceptional, with a speed range from 150 m.p.h. to 38 m.p.h. Large flaps are fitted, and two positions are provided, one for taking off and one for landing. The take-off run is approximately 100 yards and the landing run 50 yards. A photograph of the Miles-Whitney Straight Special appears on page 503.



ONE SWALLOW...: This B.A. Swallow (Pobjoy Cateract II), owned by Mr. E. Newbold of the Penang Flying Club, was actually the first and is still the only private machine in Penang.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

A GUEST AT HEADQUARTERS: Sir Samuel Hoare, G.C.S.I., G.B.E., C.M.G., Hon. Air Commodore of No. 604 (County of Middlesex) (Fighter) Squadron, with Sqn. Ldr. C. P. Gabriel, C.O. of the squadron. This photograph was specially posed for *Flight* at the H.Q., "Heath Brow," Hampstead. On the mantelpiece will be noticed a humorous sports trophy—a cup of some base metal—presented by the late Sqn. Ldr. Collett.

CHANGES IN UNIFORM

A further order has been issued on the subject of the changes in uniform already announced, under which breeches, puttees, and field boots are abolished as uniform.

Until September 1, 1936, at home, and as long as considered desirable by A.Os.C. abroad, officers when not on parade may wear breeches, etc., should they desire to do so in order to wear out their present garments or field boots. Trousers without permanent turn-ups, for parade purposes and formal occasions, will be worn with service dress. Trousers with permanent turn-ups are optional on other occasions. The trousers will be made of barathea as at present. As regards the additional cap, known as the field service cap, which has been approved, in future all officers are to possess one round-peaked cap as at present, and one field service cap. At home this change will be optional from May 1, 1936, and compulsory from September 1, 1036. In commands abroad, A.Os.C. will issue instructions to meet local conditions. The same arrangements will apply to the introduction of the blue service-dress shirt and semi-stiff collar which are to take the place of white shirts and collars.

FLYING ACCIDENTS

The Air Ministry regrets to announce that Pilot Officer Frank Frederick Essam, No. 564390 Leading Aircraftsman Jack Trundle Read, and No. 364905 Leading Aircraftsman Thomas Richard Newton lost their lives in an accident which occurred near Khartoum on May 3, 1936, to an aircraft of No. 35 (Bomber) Squadron. Pilot Officer Essam was the pilot and Leading Aircraftsman Read and Leading Aircraftsman Newton the passengers.

The Ministry also regrets to announce that Acting Pilot Officer John William Henry Radice lost his life in an accident which occurred near Sutton Bridge on May 5 to an aircraft of No. 111 (Fighter) Squadron, Sutton Bridge. Acting Pilot Officer Radice was the pilot and sole occupant.

NEW FLYING TRAINING SCHEME

As and when the new system of training is introduced at flying training schools the following regulations will apply.

The flying tests for the award of the flying-badge will be as follows:—The pupil must

(i) have completed a total of not less than eighty hours solo and dual flying on elementary and service types of landplanes of which not less than twenty hours must be solo on service types of aircraft.

(ii) be able to fly a service type of aircraft reliably and accurately by day in clear air and solely by the aid of instruments, and land consistently well at low speeds.

(iii) be able to execute correctly those normal and aerobatic manœuvres appropriate to the type of aircraft on which he is trained.

(iv) be able to recover from abnormal positions solely by the aid of instruments.

(v) have carried out on a service type of aircraft an efficient climb to 15,000 feet and remained there for thirty minutes, and

(vi) have carried out on a service type of aircraft not less than two triangular cross-country flights of 200 miles or more.

Officers and airmen undergoing the full course of training at a flying training school must qualify as service pilots on the con-

clusion of their training. To qualify, they must obtain not less than 50 per cent. of the total marks in the practical ground and air examinations in airmanship and maintenance, navigation, armament and reconnaissance, appropriate to the type of aircraft on which they are trained as laid down in the syllabi for the flying training schools, and pass the following air tests.

The pupil pilot must

(i) be able to fly consistently good compass courses in clear air or in cloud,

(ii) be able to fly at a steady height, course and speed, accurately for periods of five minutes as for bombing,

(iii) be able to climb with war load at or near maximum rate up to 15,000 feet, or service ceiling if less,

(iv) be able to fly accurately in any position of a flight of three aircraft during take-offs and landings, dives and turns as appropriate to the type of aircraft, and

(v) be able to take off and land consistently well by night.

(vi) *For attached naval officers only*:—

have carried out successfully take-offs and landings on an aircraft carrier.

The conditions for the award of "Special Distinction" or "Distinguished Pass" will be that those recommended must

(i) have attained a high degree of skill as service pilots,

(ii) have obtained a high proportion of the marks allotted for "qualities as an officer or non-commissioned officer," and

(iii) (*a*) for "Special Distinction," have obtained not less than 85 per cent. of the total marks in the combined written and practical portion of the examination for the award of the flying badge and 75 per cent. of the total marks in the practical ground and air examinations for qualification as service pilots,

(*b*) for "Distinguished Pass," have obtained not less than 80 per cent. and 70 per cent. respectively of the total marks in the examinations mentioned in (*a*) above.

ROYAL AIR FORCE GAZETTE

London Gazette, May 5, 1936

General Duties Branch

The following are granted short service commissions as Acting Pilot Officers on probation with effect from and with seniority of April 20:—L. M. Blome-Jones, A. T. B. Campling, F. L. Chadwick, P. J. Emerton, D. L. England, G. R. Fielder, J. W. S. Fowler, S. R. Gibbs, J. F. Grey, J. M. Holden, J. P. Hopkins, D. P. Hughes, F. A. Ives, L. V. James, P. N. Jennings, R. A. L. Knight, N. B. Mole (Pilot Officer R.A.F.O.), A. R. Pruddah, M. P. Richards, F. O. Thresher, F. W. S. Turner, P. F. Webster, M. L. Wells.

Pilot Officer on probation A. E. Saunders is confirmed in rank (April 14).

The following Flying Officers are promoted to the rank of Flight Lieutenant with effect from April 1, and take rank and precedence in the gradation list immediately following Flight Lieutenants, A. W. Vincent, C. L. Monckton, M. W. S. Robinson, and A. D. Grace respectively:—G. Burdick, E. C. Smith-Ross, H. P. Broad, E. R. Berry.

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated (substituted for notification in the *Gazette* of April 21):—P. Bathurst, D. M. Somerville, K. F. Ferguson, W. J. H. Ekins, D. W. Baird, J. C. Sisson, Q. W. A. Ross (April 9); R. G. S. Morgan-Smith, R. Faville, S. E. Mackenzie, S. F. Godden, N. H. J. Tindal (April 10); L. F. J. Taylor, W. L. Stewart, D. Y. Feeny, P. A. Hunter, J. F. L. Zorn, G. Atkinson, J. H. A. Chapman, J. W. Donaldson (April 11).

Wing Cdr. L. M. Bailey, A.F.C., is placed on the retired list at his own request (May 1): P/O. K. D. Stanion is transferred to the Stores Branch on probation in the rank of Flying Officer (April 14); F/O. F. M. C. Corelli relinquishes his short service commission on account of ill-health (May 3); the short service commission of Acting Pilot Officer on probation G. S. Milligan is terminated on cessation of duty (April 28).

Accountant Branch

Flying Officer on probation G. A. Linn is confirmed in rank (March 25).

Medical Branch

F. L. Whitehead, M.D., C.M., is granted a short service commission as a Flying Officer with effect from and with seniority of March 29.

Chaplains Branch

The Rev. N. F. Porter, L.Th., B.A., is granted a permanent commission (May 6).

Commissioned Engineer Officers

The following Warrant Officers are granted permanent commissions as Flying Officers on probation with effect from the dates stated and with seniority of March 18:—E. L. Magrath, J. C. Steadman (April 14); C. T. McKnight (April 22).

Commissioned Signals Officer

W/O. A. W. Coe is granted a permanent commission as Flying Officer on probation with effect from April 16 and with seniority of March 18.

Erratum

In the *Gazette* of April 21. For William Powis Welch read Wyndham Powis Welch.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

Flt. Lt. A. Lees (R.A.F. retired) is granted a commission as Flight Lieutenant in Class C (March 16); F. V. Gauntlett is granted a commission as Flight Lieutenant in Class C (March 23); F/O. C. J. Farrell is granted the honorary rank of Flight Lieutenant while serving with the Royal Air Force as a civilian assistant (March 30); F/O. R. Beresford is transferred from Class A to Class C (May 1).

The following Flying Officers are transferred from Class AA(ii) to Class C on the dates stated:—T. G. Figgis (January 11, 1935); F. A. B. Fawssett (June 20, 1935); A. T. Brock (October 12, 1935); H. F. Ruston (March 16).

P/O. N. B. Mole relinquishes his commission on appointment to a short service commission in the Royal Air Force (April 20).

SPECIAL RESERVE

General Duties Branch

S. D. P. Connors is granted a commission as Pilot Officer on probation (March 26); G. M. Gardner is granted a commission as Pilot Officer on probation (March 21).

Medical Branch

A. C. Fraser, M.R.C.S., L.R.C.P., is granted a commission as Flying Officer (February 12).

AUXILIARY AIR FORCE

General Duties Branch

No. 601 (County of London) (Fighter) Squadron.—F/O. R. J. Holland relinquishes his commission on completion of service (April 3).

AUXILIARY AIR FORCE RESERVE OF OFFICERS

General Duties Branch

R. J. Holland is granted a commission as Flying Officer in Class C (April 3).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commander.—W. R. Cox, M.C., A.F.C., to Headquarters, No. 3 (Bomber) Group, Andover; for Armament duties vice Wing Cdr. R. L. Stevenson, M.B.E., 26.4.36.

Squadron Leaders.—R. L. Ragg, A.F.C., to Headquarters, No. 3 (Bomber) Group, Andover; for Navigation duties, 20.4.36. V. E. Groom, D.F.C., to No. 58 (B) Squadron, Upper Heyford; to command, 22.4.36.

Flight Lieutenants.—N. C. Ogilvie Forbes, to No. 8 Flying Training School, Montrose, 20.4.36. F. J. Fressanges, to No. 9 Flying Training School, Thornaby, 20.4.36. D. J. Waghorn, to No. 10 Flying Training School, Tern Hill, 20.4.36. R. B. Dashper, to Armament Training Camp, Aldergrove, 2.3.36. M. W. S. Robinson, to No. 24 (C) Squadron, Hendon, 22.4.36. J. D. Rutherford, to No. 5 Flying Training School, Sealand, 27.4.36. A. B. Woodhall, to No. 1 Flying Training School, Leuchars, 18.4.36. E. H. Bellairs, to No. 26 (Army Co-operation) Squadron, Catterick, 23.4.36.

Flying Officers.—J. O. Hinks, to Headquarters, Training Command, Stanmore, 21.4.36. J. G. Macintyre, to No. 602 (City of Glasgow) (B) Squadron, 21.4.36. H. C. Bazeley, to No. 16 (Army Co-operation) Squadron, Old Sarum, 27.4.36. H. L. Maxwell, to No. 26 (Army Co-operation) Squadron, Catterick, 27.4.36. C. L. Troop, to No. 13 (Army Co-operation) Squadron, Old Sarum, 27.4.36.

Acting Pilot Officers.—The undermentioned are posted to the Units shown with effect from April 18, 1936:—C. L. F. Colmore, J. S. Laird, A. W. M. Street, B. J. Thomas, T. R. Thomas, E. R. White, N. G. Cooke, B. E. R. Bowden, D. St. Q. Robinson, R. D. Tate, S. McC. Boal, J. A. Crockett, J. M. Griffith-Jones, D. F. Spotswood, J. C. Betts, J. H. D. Chapple, K. D. Currie, P. D. J. Strong, M. V. Longbottom, D. F. O'Mahony Leahy, C. D. Swain, C. A. Butler, G. V. Cook, G. V. Smither, H. P. Blatchford, A. M. Brown, H. M. Crump, B. MacCallum, and E. C. Inglefield, all to No. 6 Flying Training School, Netheravon. C. P. Bomford, J. H. Coghlan, D. B. Hobson, E. J. S. Jones, P. D. A. Lister, E. E. M. Angell, J. C. Boulter, P. H. E. Burke, W. D. Coppinger, S. P. Crawley, J. T. MacInnes, R. D. H. Maxwell, J. E. Scoular, P. G. Chapman, H. Henry-May, P. F. R. Vaillant, J. S. Kendrick, P. H. R. R. Terry, J. A. Bateson, G. S. Braithwaite, T. F. T. Chambers, W. G. Craddock, L. F. Henstock, J. E. Y. Le Moine, J. H. McMichael, V. Mitchell, and P. J. S. Shaughnessy, all to No. 7 Flying Training School, Peterborough.

Medical Branch

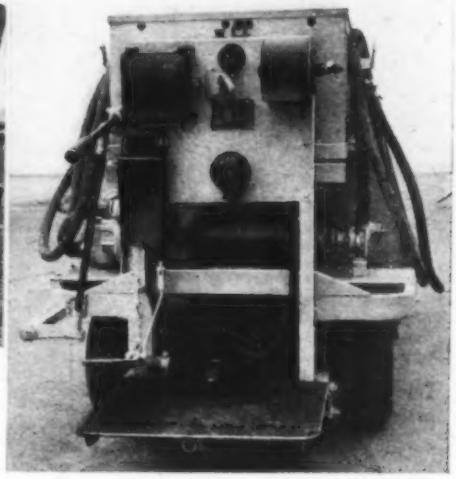
Wing Commander.—C. P. Barber, to No. 6 Flying Training School, Netheravon; for duty as Medical Officer, 26.4.36.

Dental Branch

Flying Officers.—I. St. C. Alderdice, to No. 1 School of Technical Training (Apprentices), Halton, 27.4.36. O. F. Brown, J. H. G. Fensom, R. A. Pepper, to Home Aircraft Depot, Henlow, 27.4.36. S. Hill, to R.A.F. Depot, Uxbridge, 27.4.36. W. A. H. Smith, to R.A.F. Station, Manston, 27.4.36.

THE INDUSTRY

A New Fuelling Unit : Another Car Firm Joins the Industry : Drills for Awkward Corners



The Blackburn-Electricar refuelling unit (left) with its oil pump in use. On the right is seen the driving platform, with the traction motor between the wheels, and the pump motor, with its shafts and pumps, placed transversely. A description appears below.

For Facilitating Fuelling

WITH plenty of scope for practical experiment at its Brough and Hanworth Reserve schools, the Blackburn Company has evolved what should be an extremely efficient electrically driven refuelling unit. Capt. Norman Blackburn and Mr. Tom Bancroft are responsible for the design.

On a four-wheeled, rubber-tyred chassis are mounted a 220-gallon fuel tank and a 10-gallon oil tank. A storage battery supplies current for a traction motor, which operates the rear wheels by shaft drive, and for another motor driving the two pumps, fuel and oil respectively.

At the rear of the vehicle is a driving platform for the operator, who steers by means of a tiller. Having started by pressing a pedal and setting the three-speed-and-reverse controller to the speed required, the operator drives over to the aircraft to be refuelled. Releasing the pedal switches off the driving motor and applies the brakes. The operator moves the pump switch, "up" for oil or "down" for fuel, lifts the hose off its bracket, inserts the nozzle in the tank filler and opens the cock, closing it when the requisite quantity of fuel or oil has been delivered. Both liquids are filtered in the truck and need no external filter. A small step ladder is carried on the truck for access to top centre section tanks. The rates of delivery are 8 gall./min. for fuel and 2 gall./min. for oil.

The truck can also be used for towing small aeroplanes if desired, a suitable attachment being provided at the front end.

At Brough and Hanworth the trucks are usually left on charge throughout the night and operated during the daytime without recharging. On occasion they have run for two consecutive days without recharging.

Electricars, Ltd., of Birmingham, have constructed the Blackburn-Electricar to the requirements of the Blackburn Aeroplane and Motor Co., Ltd., Brough, Yorks, and the latter hold the sole selling agency.

The standard truck has contents gauges and is fitted with an electric horn, charging plug and spot light. The price, with batteries and Westinghouse charger, is £350 ex works. If required, delivery meters can be supplied as extras.

Rolls-Royce and Expansion

AT the 29th annual meeting of Rolls-Royce, Ltd., held at Derby last Friday, Lord Wargrave (the chairman) said he was glad to report the continuous prosperity of the company. The profit of £349,802 was again a record. In the previous year there was a profit of £291,611 and the directors now proposed an additional distribution of 2½ per cent. on the 20 per cent. paid for 1934. With the £73,316 brought forward from 1934 there was £423,118 available, of which £42,482 had already been distributed as interim dividend at 5 per cent.

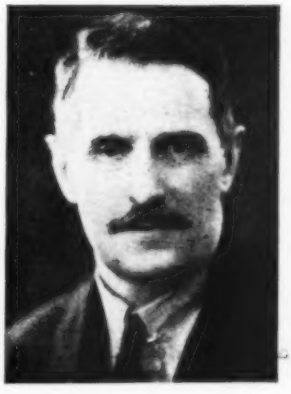
The directors recommended that a final dividend of 15 per cent., plus a cash bonus of 2½ per cent., be declared, all subject to income-tax. This made a total distribution of 22½ per cent.

The company were taking an important part in the Government expansion programme to build up in the next few years an Air Force which would ensure that this country could defend itself adequately against attack. During 1935 and the present year the Kestrel engine had been ordered in large quantities and all the Air Ministry's requirements for production had been fulfilled as a result of a large extension to the works. The fact that they were the only company supplying liquid-cooled aero engines in any appreciable quantity to the British Government indicated that they were still first in this field, and their technical officials were working continuously to maintain and improve the position.

As at present anticipated the expansion programme would come to an end within three years, and this would inevitably mean a heavy reduction in the demand for aircraft and engines. When this situation arose difficulties would have to be met.

A Welding Convention

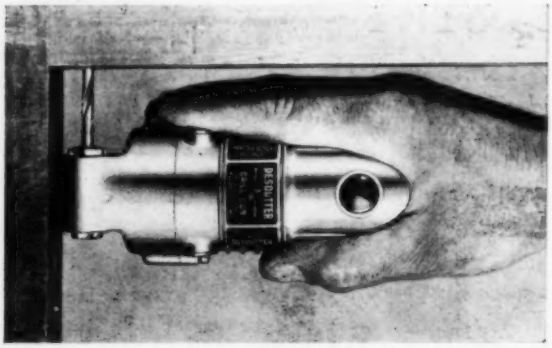
MARKING the fiftieth anniversary of the industrial production of oxygen and centenary of the discovery of acetylene, the twelfth International Congress of Acetylene Welding and Allied Industries will be held from June 8 to 13 at The Caxton Hall, Westminster. A number of factories will be visited, among them the works of the British Oxygen Co., Ltd.



Full details of the proposed programme in English, French and German are given in a handbook issued by the General Secretariat of the Congress, 639, Grand Buildings, Trafalgar Square, London, W.C.2. The Congress is organised by the British Acetylene Association.

Major C. P. N. Raikes, M.C., chairman of the organising committee of the Welding Congress. He is overseas director of the British Oxygen Co. Ltd.

The Industry



The Desoutter corner drill gun in use in a typically awkward situation.

The Desoutter Armoury

ILLUSTRATED on this page is a gun which, like the more orthodox variety, is of the greatest value in tight corners. Known as a corner drill gun, it is one of the many instruments from the Desoutter portable tool range, and one which is proving of particular value to the aeronautical industry, especially in relation to the steady increase in the amount of metal construction and the ever-growing amount of equipment which has to be fixed and fastened in the internal economy of military aircraft. The photograph shows how close to an inaccessible corner the drill may be introduced. Like most of the other Desoutter tools, it is obtainable both in the electric and pneumatic types, and is extremely light in weight (2½ lb.).

Among the great variety of other tools may be mentioned the standard electric drill guns for wood and metal, and electric grinders and nut-runners. The pneumatic range includes drills of straight and pistol types, together with a screwdriver, a nut-runner and a spanner. The new $\frac{5}{16}$in. rotor air drill, running at 2,100 r.p.m., weighs only 2½ lb.; the consumption is 11 cu. ft. of free air per minute at 80-100 lb./sq. in., and all objectionable exhaust noise has been eliminated.

A pneumatic high-speed rotor drill, which runs at 13,000 r.p.m., is another tool which is particularly popular in the aircraft industry. All these tools can be fitted with either a Brooke chuck or Jacobs chuck to choice, without extra charge.

Vibrationless running, in spite of the almost incredibly high speed of 55,000 r.p.m., is a feature of yet another pneumatic tool, a router driven by an impulse reaction turbine. Fitted with a ¼in. capacity chuck, it is also adaptable for grinding or drilling. The weight is only 3 lb.

Among the heavier tools is the Vidal range of electric tools, which are made for bench use in the larger sizes. Like the others, they are made from British materials at the factory of Desoutter Bros., Ltd., at the Hyde, Hendon.

It is interesting to note that the firm keeps at Hatfield its own aeroplane, which can at once be despatched to any aerodrome when service or demonstrations are required.

Aircraft Components Ltd.

AIRCRAFT COMPONENTS, LTD., the undercarriage specialists of Cheltenham, wish it to be made clear that their name has not been changed; the title of AXC, Ltd., was a purely formal one adopted during the change-over from a private to a public company.

Lagonda and Aircraft Parts

AN interesting note appears among the company registrations on this page. It signifies that Lagonda Motors, who have just completed considerable extensions to their works, have formed, with Close Bros., Ltd., a company for the manufacture of aircraft components. The new company, Wyndham Hewitt, Ltd., has taken over a section of Lagonda works at Staines for this purpose, but the production of Lagonda cars will not be interfered with.

The board of the new company consists of Mr. A. P. Good, chairman; Mr. W. O. Bentley and Mr. R. Watney, who are directors of Lagonda Motors; Mr. G. P. Barker, director of Close Bros., Ltd.; Mr. H. H. Dunkerley, director of Heatly Electric Forgings, Ltd.; Mr. M. Geddes; and Mr. Wyndham Hewitt.

Mr. Hewitt, who will act as managing director of the new company, was formerly assistant chief engineer of Imperial Airways.

Death of Sir William Mallinson

FLIGHT regrets to record the death last week of Sir William Mallinson, Bart, J.P., at the age of 81 years. Sir William was governing director of the Aeronautical and Panel Plywood Co., Ltd., and had been interested in the production of aeronautical plywood from the earliest days of the industry.

Airco Moves

THE well-known agency of Airco, Ltd., of which Capt. Rex Stocken is managing director, moved last Monday into larger premises at 3, St. James's Square, London, S.W.1 (Whitehall 4952).

Incidentally, they have now been appointed sole representatives in the British Isles for the aerodrome lighting equipment manufactured by Clarke, Chapman and Co., Ltd.

PUBLICATIONS, ETC., RECEIVED

Brassey's Naval Annual, 1936. Edited by Comdr. C. N. Robinson, R.N. Price 25s. William Clowes and Sons Ltd., 94, Jermyn Street, S.W.1.

National Advisory Committee for Aeronautics. Report No 540: Interference of Wing and Fuselage from Tests of 209 Combinations in the N.A.C.A. Variable-Density Tunnel, by E. N. Jacobs and K. E. Ward, price 10 cents; No. 543: Effects of Air-Fuel Ratio on Fuel Spray and Flame Formation in a Compression-Ignition Engine, by A. M. Rothrock and C. D. Waldron, 5 cents: No. 548: Effect of Tip Shape and Dihedral on Lateral-Stability Characteristics, by J. A. Shortal, 5 cents. Twenty-first Annual Report of the National Advisory Committee for Aeronautics, 1935, 15 cents. Superintendent of Documents, Washington, D.C., U.S.A.

Cent "Pou-du-Ciel." Price 3s. 9d. Librairie Hachette, 18, King William Street, London, W.C.2.

Stormy Petrel, by Charles Kennett. Price 10s. 6d. Hurst and Blackett, Ltd., Paternoster Row, London, E.C.4.

Technical Publications of the International Tin Research and Development Council No. 34: Some Recent Investigations on the Corrosion of Tin, by D. J. Macnaughtan and E. S. Hedges. Manfield House, 378, Strand, London, W.C.2.

Les Usines. Hispano-Suiza, Rue du Capitaine Guynemer, Bois-Colombes (Seine), France.

This Flying Game, by Brigadier General H. H. Arnold and Major Ira Eaker. Price 12s. 6d. Funk and Wagnalls Co., 27a, Farringdon Street, London, E.C.4.

Defence and Disarmament: A Plain Guide, by David Keir. Price 6d., *New Chronicle* Publications Dept., 19-22, Bouverie Street, London, E.C.4.

*Jaarverslag van de Nationale Luchtvaartschool, n.v.*1935. Secretariaat, N.L.V.S., Waalhaven, Rotterdam.

Flight To-day, by J. L. Nayler and E. Ower. Price 3s. 6d., Oxford University Press, Amen House, Warwick Square, London, E.C.4.

Fighter Pilot, by "McScotch." Price 10s. 6d., George Routledge and Son Ltd., Broadway House, 68, Carter Lane, London, E.C.4.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

WYNDHAM HEWITT LTD. was registered as a public company on May 4, with a nominal capital of £251,000 in 500,000 ordinary shares of 10s. each and 20,000 management shares of 1s. each. The objects are to carry on the business of manufacturers of and dealers in aircraft of all kinds, motor vehicles, etc. Directors: Alan P. Good (chairman of L. G. Motors (Staines) Ltd.); Geoffrey P. Barker (director of Close Brothers Ltd.); Walter I. Bentley (director of L.G. Motors (Staines) Ltd.); Henry H. Dunkerley (director of Heatly Electric Forgings Ltd.); Magnus Geddes, engineer; Richard G. Watney (managing director of L.G. Motors (Staines) Ltd.); Frederick W. F. Hewitt, engineer. Solicitors: Herbert Smith & Co., 62, London Wall, London, E.C.

NASH AND THOMPSON LTD.—Private company, registered May 2. Capital, £10,000 in £1 shares. Objects: to acquire the business of aeronautical armament and accessory manufacturers carried on by Nash and Thompson Ltd., at Kingston, Surrey, and elsewhere. Directors: Archibald G. Frazer Nash, mechanical engineer; Esmonde G. Thompson, director of public company.

N. AND T. (ENGINEERS) LTD.—Private company, registered May 2. Capital, £100 in 1s. shares. Objects: to carry on business as mechanical, motor, electrical, constructional, consulting and aeronautical engineers, etc. Directors: Archibald G. F. Nash, mechanical engineer; Esmonde G. Thompson, director of public company.

C.L.W. AVIATION COMPANY (1936) LTD.—Registered as a private company on April 30, with a nominal capital of £15,000 in 5s. shares. Objects: to acquire the undertaking and assets of C.L.W. Aviation Co. Ltd. (in liquidation), and to carry on the business of manufacturers and dealers in aeroplanes and parts thereof, etc. Directors: Stanton W. Cole, O.B.E. (director of S. Wilding Cole, Ltd.); Wm. P. Mackintosh (director of Mackintosh Bros., Ltd.); Wm. J. Webb; Arthur Levell; Francis S. Welman. Registered office: Gravesend Airport.

INCREASES OF CAPITAL

AIRSCREW COMPANY LTD. (Weybridge Road, Weybridge).—The nominal capital has been increased by the addition of £125,000 beyond the registered capital of £50,000. The additional capital is divided into 250,000 ordinary shares of 2s. and 100,000 6 per cent. cumulative preference shares of £1 each.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

Published May 14, 1936.

28927. TEISSEYRE, J., and ZDANIEWSKI, A.: Vertically displaceable rudders for aircraft (445,771).
20358. SHEEN, W. C.: Aircraft instruments (445,586).
637. GRIFFIN, E. G. (Burnelli Aircraft Ltd.): Aeroplanes (445,634).
7307. STEVENS, A. H. (Aviation Manufacturing Corporation): Controllable-pitch propellers (445,640).
12835. WASEIGE, C. R.: Aerial propellers with variable pitch (445,652).
32154. BOEHME, G.: Toy aeroplanes (445,826).
34186. MAYO, R. H.: Means for launching aircraft (445,829).

Boy Meets Girl